The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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On the Modern Laboratory

DR. CHARLES PARSONS, himself a distinguished chemist before he became the Secretary of the American Chemical Society, rightly describes the laboratory as the key to progress. Even yet it is not universally recognised as such, but its recognition is immensely more general than it was at the beginning of the century, and, what is equally important, is steadily extending. And with its spread has naturally come a vast improvement in all the furnishings and equipment on which the laboratory worker depends. The quaint old prints showed the laboratory to be a very simple and crude affair; the modern laboratory has become a highly organised scientific workshop, with the appropriate mechanical apparatus for its many delicate operations. Mention is made in this issue of many of the products now available for the use of the laboratory worker, intended to facilitate his tests and investigations by ensuring increased cleanliness, lighting, precision, efficiency, and comfort. It is no longer, or should not be, the "messy" department it once was; laboratories worth maintaining at all are worth maintaining well, in mechanical apparatus and instruments no less than in the calibre of the staff. The variety of laboratory equipment now available and the comparative moderation of its cost remove all excuse for third-rate installations, in unsuitable quarters; these, where they still exist, mark the failure of their owners to keep step with the times.

It cannot be too often asserted that the supreme object of laboratory as of every other sort of research is the increase of precise knowledge, not the discovery of short cuts to wealth. Yet it is true, as numberless cases demonstrate, that large fortunes have been made by laboratory discoveries and their efficient applications in industry. These, however, are the incidental and remoter results arising out of new knowledge that was originally won for its own sake, without any prevision of financial or economic consequences. It is important that in this matter the right order should be observed; that first things should come first. Where the industrial firm decides on a scientific service because such a service is essential to its efficiency, it often secures, in addition to the efficiency on which it may safely calculate, unexpected returns that repay the expenditure manifold. But, apart from such windfalls, it would still have a service that was well worth paying for. Where, however, the order is reversed, and the laboratory is started not for real scientific service, but in the hope of some speculative gains that no scientist can foresee or guarantee, disappointment is a natural and, in a sense, a proper result, for the fundamental idea is false and foreign to the essential spirit of research. Let our great industrial concerns by all means go in for more and more laboratory research, but equally let them grasp the right spirit of the enterprise and start from the right end. Rarely, then, will they have ground for disappointment with the returns.

After-Dinner Chemistry

Two divergent tendencies are manifesting themselves among the organisers of chemical dinners. One is towards cutting out the usual after-dinner speeches altogether, or at least reducing them to proportions that deprive the invitation to speak of any pretence to flattery, and giving up the evening to refined jazz music and dancing. The reason advanced for the change is that people nowadays will not listen to after-dinner speaking. It is a very good reason, indeed, if the argument is confined to some of the speaking that we have been compelled to endure, but it may also be true that the suffering inflicted on innocent guests was not due to the mere practice of after-dinner speaking, but to the selection of the wrong type of speaker by people who do not understand the right type of speaker for such occasions. So the speaker and his speeches are dismissed in favour of a couple of hours' intellectual dancing immediately after a heavy meal. Which of these forms of entertainment is

the lighter, we should not dare to decide. Nor should we like to assess the propagandist value of either.

On the other side, the experiment has been tried of expending the mental energy developed by good food and good wine on the discussion of some live and practical topic in which the guests have a general interest. Recently the Institution of Chemical Engineers dared to cut out of its after-dinner programme such noble toasts as "The Army, Navy and Auxiliary Forces" and "The Bishops, Clergy and Ministers of all denominations," and to invite a symposium on "Why not Foreign Chemical Plant?" It was a complete and astonishing success. In the genial social atmosphere, members relaxed their usual caution towards competitors, and competed with one another in disclosing the sacred things at the back of their minds. Nor is there any reason to think they regretted it. For the collected views made up a particularly interesting and useful pamphlet. The Chemical Engineering Group, who regard useless conventions as made to be broken, are following the Institution's example; we are not sure, indeed, if they did not originally introduce it. After their annual dinner on May 9, they propose to have an informal discussion of a number of topics of interest to members of the Society of Chemical Industry. Sir Frederic Nathan is to introduce the first—"The international abstracting and classifying of scientific literature"; Dr. Levinstein, who can be very entertaining after dinner even with chemical industry politics, is to speak on "Chemistry House—the present position"; Mr. L. J. Pooley is to follow with some forecast of "The jubilee meeting of the Society." From the fact that "the closure will be applied not later than midnight," we infer that the chemical engineers intend to make a jolly, as well as improving, evening of it—as they generally manage to do. Their invitation certainly sounds seductive—"If you have any useful ideas on any of these subjects, come along and tell the meeting briefly about them. If you have no such ideas, come and get some at the meeting."

The Title "Chemist"

It appears, from the current issue of the Journal of the Institute of Chemistry, that during the sittings of the Departmental Committee on the Poisons and Pharmacy Act, Dr. Clayton, the new president, and the Registrar gave evidence in support of a memorandum on the title of "Chemist," and that their views were "sympathetically received." The Institute's object, of course, is to have any doubt removed that qualified men of science engaged in teaching or practising in the profession of chemistry should have the right to use the name and title of "Chemist." They expressed the hope that the word "Pharmacist" would be more and more generally used to denote those who practise "pharmacy," and that means might be found to identify more definitely those who practise "chemistry."

In their report on this matter, the Departmental Committee point out that the use of the title "Chemist" by an unregistered person is prohibited generally by the Pharmacy Act of 1868. The result is that a member of the Institute of Chemistry may not, legally, call himself a chemist. Though in practice this prohibition has not been enforced, it is, in the Committee's opinion, wrong that it should remain on the statute book. The witnesses who gave evidence on behalf of the Pharmaceutical Society raised no objection to the use of the title "Chemist" by certain qualified, though unregistered, persons, except in connection with a retail business. "This," the Committee state, "is a concession long overdue; and we propose that it should be law." The relinquishment of the title "Chemist" by registered pharmacists was suggested; but this is, in the committee's opinion, impracticable both from the point of view of the expense involved in the alteration and removal of signs and facias affixed to pharmacists' shops, and of the popular connotation of the word itself. Further, even in the event of such relinquishment, the maintenance of a high standard of qualification for chemists, which is the avowed object of the Institute of Chemistry, would not, in present circumstances, be secured. This report is now under the consideration of the Legal and Parliamentary Committee of the Institute.

Another point of interest has arisen in connection with the sale of poisons by means of automatic machines. It was raised in a case which the Pharmaceutical Society took to the Wood Green County Court for the purpose of securing a decision. The Society's case is that the business of a chemist and druggist, which includes the right to sell poisons under regulation, can by statute only be conducted by a qualified chemist, and that this authority cannot be transferred to an automatic machine. Judge Crawford recognises the importance of such a case, which may apply to hundreds of shops throughout the country, and which, as he remarked, may go to the House of Lords. The case has been adjourned and the Judge's decision will be awaited with interest.

Books Received

Annual Report of the Society of Chemical Industry on the Progress of Applied Chemistry, 1929.—Vol. XIV: The Society of Chemical Industry. Pp. 775. 7s. 6d. (members), 12s. 6d. (non-members).

Directory of Paper Makers of Great Britain and Ireland for 1930. Marchant Singer and Co. Pp. 276. 5s. 6d.

The Calendar

Apl. 25 & 26	Faraday Society. General Discussion on "Optical Rotatory Power." Annual General Meeting.	Burlington House, Piccadilly, London.
28	Oil and Colour Chemists' Association. Annual Dinner. 7 p.m.	Connaught Rooms, London.
29	Imperial Chemical Industries: Annual meeting. 11.30 a.m.	Central Hall, Westminster.
29	Royal Photo. Society: Miss F. M. Hamer on "Optical and Photographic Properties of Dyes of the Thionine and Related Types." 7 p.m.	35, Russell Square, London.
May 1	Chemical Society. 8 p.m.	Burlington House.
1 & 2	Iron and Steel Institute: Annual meeting.	Institution of Civil Engineers, London.
2	Faraday Society. "On Coagulation." Professor Dr. G. Wiegner. 8 p.m.	Burlington House, Piccadilly, London.
5	Society of Chemical Industry (London Section): "Observations on the Condensations between Formaldehyde and Aromatic Compounds." Prof. G. T. Morgan. 8 p.m.	Burlington House, Piccadilly, London.
7	Society of Public Analysts. 8 p.m.	Burlington House.
7	Institute of Metals. Annual May Lecture. "The Influence of Technique on Research." Major F. A. Freeth. 8 p.m.	Institution of Mechanical Engineers, Storey's Gate, London.

An Australian Inquiry

To the Editor of THE CHEMICAL AGE.

SIR,—I read with great interest your publication (No. 548) of December 28, 1929, in which was given a survey of the chemical industry in England, but I noted more particularly the references to the manufacture of methanol.

The manufacture of methanol from water gas is becoming of increasing interest and importance to the gas industry in Australia, as being possibly one solution to our problem of the disposal of coke. I noticed with considerable interest that the manufacture of methanol on an industrial scale had already commenced in the United States of America, France, Belgium and Italy, and I shall very much appreciate your assistance if you will give me what information you have regarding the progress which has been made in those places; also the names and addresses of firms supplying plants for the manufacture of methanol. Any other information which you feel would be of interest to us will be gratefully received and very much appreciated. Thanking you in anticipation, yours, etc.,

WORKS ENGINEER.

Sydney, Australia.
March 13.

[We publish this inquiry as it stands in the belief that it may be of general interest to the chemical industry. The name and address of the writer may be obtained by any firm that desires to communicate with him.—ED. *C.A.*]

Patent Law Reform

To the Editor of THE CHEMICAL AGE.

SIR,—Whilst agreeing with Mr. Jephcott's thesis in his letter to you (April 19) there are one or two aspects of the situation with regard to medical patents that are of considerable importance. In the first place, there appears to be a general misunderstanding as to what constitutes a "Medical Patent" and as to what degrees of objection have been expressed by various sections of the scientific and medical sections of the community.

Dr. Pyman is quoted as having said that "medical ethics prevented the patenting of drugs by registered medical practitioners," a statement which can have very different meanings according to the interpretation of the phrase "patenting of drugs." Within the last few weeks a distinguished collaborator with whom I have the privilege of working has sought the opinion of the General Medical Council, who have laid it down categorically that there is no ethical objection to a registered medical practitioner patenting, either alone or in conjunction with non-medical workers, any patent dealing with the processes of manufacture of chemical products, whether they are to be used for medical purposes or not. And rightly so. The medical man who spends his hard-earned income on research work may, after the expenditure of some thousands of pounds and many years' hard work, light upon a valuable drug. Is he to have no reward save the thanks (*sic !*) of the public ? It has been said that the day of the individual is past, but this is open to discussion, and if we attempt to prevent the individual research worker recouping the expense, both of time and money, to which he has been put, we are deliberately discouraging individual research. It may be pointed out that individual research is research in its finest form, and the armchair critics, who discuss medical ethics and "dedication to the British public" from the complacent security of a comfortable competence charitably supplied by a public institution, would do well to distinguish between the just reward for service rendered to the community, and the anti-social results of restricting the *use* of a valuable remedy to one or two persons.

The obvious point is that while patents are granted at all, it is fair both to the community and to the individual to grant patents to medical men for the processes by which their remedies are manufactured. The question of ethics only arises where an attempt is made to patent the *use* of a compound. To take an example; if after ten years' hard work and the expenditure of the money that should make old age comfortable, a medical man discovered that a certain complex organic compound would cure cancer, he would be perfectly justified in taking out a patent for the manufacture of that substance; but he would be morally guilty if he attempted to patent the use of the compound, since such a patent would undoubtedly restrict the most advantageous use of the new product. As a matter of actual fact, such a patent would probably not be granted.

It would not, I think, be too much to suggest that a great deal is talked about the ethics of patents by people who have had no experience of them, and in many cases little or no experience of pioneer research. British Patent Law is the soundest in the world, and it would be difficult to find even one example where a patent has restricted the effective use of a medicinal compound, and before the sheep of our community are herded blindly through useless legislature—so-called "reform"—the matter should be well ventilated in the technical and lay press.—I am, etc.,

G. MALCOLM DYSON.

Loughborough.
April 17.

Chemistry House Scheme

To the Editor of THE CHEMICAL AGE.

SIR,—The scheme as outlined by Professor Thorpe is welcome as being the first official pronouncement that has yet been made on the subject of the new chemical headquarters. The advantages are obvious, not the least of them being the centralisation of the library, and the creation of a lecture hall and meeting rooms in the centre of London, which will overcome the geographical difficulties alluded to by Sir Arnold Wilson.

Since the agreement arrived at by the participating societies is that they shall pay ground rent to an amount not exceeding their rents at present, this aspect of the financial position calls for no comment, but it is to be noted that the chemical societies concerned are required to raise £140,000, which is their share towards the cost of the building. The Chemical Society is to be housed free in exchange for its library facilities.

But it is not easy to see, outside these advantages, admittedly considerable, what others there are. A scheme which —with whatever good reasons—does not include the Institute of Chemistry, the Oil and Colour Chemists Association, and the British Association of Chemists, all of which have headquarters, and which makes no allusion to the Society of Public Analysts, the Biochemical Society, and the International Society of Leather Trades Chemists, who at present have no offices, cannot properly be said to be a scheme for a chemical headquarters. The Institute of Rubber Industry, on the other hand, though it includes a very large number of chemists, is not formally a chemical society, but it is to be included in the chemical wing.

Nor is it clear that drastic economies will be effected unless the membership of the Chemical Society and of the Society of Chemical Industry is greatly increased and that quickly. It might be done if it were possible immediately to introduce a joint subscription of £3 10s. No one, I suppose, will argue that it will be possible to do this or even at first to reduce the subscription at all. It has been suggested, at the same time, that some members, even if a reduced joint subscription were introduced, would continue *ex gratia* to pay the two subscriptions. In this connection, they will perhaps be forgiven who do not share this optimistic view. Further, the suggestions made regarding publications are excellent, but on the face of it they will hardly make for economy. In short—and the occasion calls for frankness—the plea of economy can be ruled out. On the present membership of the two societies a joint subscription of £3 10s. is one no living actuary would look at.

To criticise a scheme with many and obvious advantages is a thankless task, but the supreme difficulty remains that it seems to exclude anything chemically comprehensive. Provision is to be made, it is true, for tenant societies, but how many can be accommodated if such societies as the Association of British Chemical Manufacturers, the National Federation of Iron and Steel Manufacturers, the Mining Association of Great Britain, and others are to be included ?

It may well be that these difficulties are not insuperable, but to ignore them will be to invite a second estate worse than the first.—I am, etc.,

HENRY T. F. RHODES.

British Association of Chemists,
175, Piccadilly, W.1.

The Laboratory—the Key to Progress

By Dr. Charles L. Parsons

In connection with the notes, published in this issue, on laboratory furnishing and equipment, it may be interesting to give the views of Dr. Charles L. Parsons, the secretary of the American Chemical Society on the laboratory as the key to progress, on the occasion of the dedication of the Charles James Hall of Chemistry, New Hampshire University. Laboratory research in the United States is financed, both by the State and by private industry, on a particularly generous scale, and great enterprise is shown in its industrial applications.

WEBSTER defines a laboratory as "a place devoted to experimental study in any branch of natural science." There can be no "experimental study" without skilled workers and modern equipment. All three are integral parts of the laboratory of to-day—"useless each without the other." Human learning began with thought. Thought was aided by observation and experience. For ages, discovery was largely accidental. Teaching was the transfer of new or accumulated thought from philosophers to their pupils. Progress depended on reason and imagination. For centuries, universities were little more than places for monastic discussion of theories. Very gradually the method changed. Man began to study facts. From observation of facts new reasoning developed. This led to the necessity for new data and this, in turn, to experimentation. Experimentation required new facilities and the laboratory was gradually born. Only facts lead to correct judgment—a principle too little recognised. "The smallest fact," said Huxley, "is a window through which the infinite may be seen."

The Growth of Laboratory Research

Real laboratory procedure began little more than one hundred years ago when Boyle and Lavoisier brought exact measurement to bear, with control of conditions and reproduction at will. With these the possibility of reasonable hypothesis and correct conclusions were born. Coincident therewith came unprecedented acceleration of human progress so that it has been correctly said, "Man has made greater advancement in the last hundred years than during his whole previous existence." It may as truthfully be claimed for the last fifty years—almost for the last twenty-five.

Within this time our laboratories have multiplied almost by geometrical progression. In 1900 there was scarcely an industrial research chemical laboratory in America worthy of the name, although important beginnings had been made. To-day the National Research Council lists one thousand. Little more than fifty years ago the chemical laboratory was beginning to find place in our universities, their first idea being simply to teach. Even with our universities the idea of laboratories for research began almost with the century. To-day no university can secure students or carry public respect without modern laboratories, adequate equipment, and highly trained instructors, as well as investigators infused with the spirit of research.

The laboratory is, and more and more will be, the key to human progress. The door opens slowly but new vistas constantly appear. Progress comes by cumulative effort rather than by isolated discovery. We are still far from the zenith of knowledge. Who, listening to the words of the great man who leads our nation, whose life has been based on the slogan, "Facts first, then judgment," could fail to be convinced of the laboratory's place in our domestic economy? President Hoover said:

"Discovery and invention do not spring full-grown from the brains of men. The labour of a host of men, great laboratories, long, patient, scientific experiment build up the structure of knowledge, not stone by stone, but particle by particle. This adding of fact to fact some day brings forth a revolutionary discovery, an illuminating hypothesis, a great generalisation or a practical invention. Research both in pure science and in its application to the arts is one of the most potent impulses to progress. For it is organised research that gives daily improvement in machines and processes, in methods of agriculture, in the protection of health, and in understanding. From these we gain constantly in better standards of living, in more stability of employment, lessened toil, lengthened human life and decreased suffering. In the end our leisure expands, our interest in life enlarges, our vision stretches. There is more joy in life. The nation to-day needs more support for research. It needs still more laboratories."

Twenty-five years ago the earning power of the laboratory was only beginning to be appreciated. To-day the millions of dollars expended on our endowed institutions and the added millions yearly invested by our successful corporations in brains and facilities for brain creation is adding so vastly to our knowledge that the great problem of chemists to-day is to secure funds to record in print the output of new knowledge. Unless ample endowment for the recording of research is forthcoming, our children will labour again in fields already tilled.

Lessons from Germany

In no country was the value of fundamental and applied research more early or more highly appreciated than in Germany. In no country were the financiers more quick to utilise chemical brain power and apply the discoveries made. In no country was greater financial support given by the Government and by the people. Even German labourers lifted their hats when they passed the doors of the research laboratories that were rapidly increasing German wealth. They came near giving Germany control of the world. In her great laboratories, hundreds of fresh minds were yearly developed in chemistry, and students of other lands were welcomed, inspired, and trained. Through her chemical advancement and supremacy alone she was able to feed her people, manufacture her munitions, and sustain the World War. When the War was over it was again to the chemical laboratory that Germany looked to re-establish herself in the world's economy. By the pursuit of such a policy she has already made the most rapid recovery from disaster in world trade which history records.

America was already becoming strong-minded chemically before the war began. Her chemists proved in the war their training and worth by their accomplishments. Already our great universities were offering superior facilities in teachers, laboratories, and the tools of the profession, although most of those facilities were manufactured abroad. Few students were going to Europe for study, and they chiefly for the halo it still gave. In the war American chemists played a part not yet realised. They made munitions possible. They planned and built great chemical plants not only for high explosives and poison gases, but for many materials that went into every essential from brass cartridges to airplanes and battleships. No chemist stayed in the ranks without concealing his knowledge and training. Early segregated as a profession by Government order, some twenty thousand were held to service through chemistry, over four thousand wearing uniform in this capacity. Through their efforts and guidance America, at the armistice, was ready to supply munitions not only for itself but its allies. In mustard gas alone our resources were so great that the menace, known to the enemy, is reputed to have hastened, if not determined, the end. All of its success and preparedness emanated from the laboratory.

The war, more than anything else, made America a chemical nation, excelled by none to-day. Economically, chemists, and their allied scientific associates, have made America, save for labour cost, independent of the world. In truth, the words of Sir Wm. Ramsay, "The country which is in advance in chemistry will also be first in wealth and prosperity," find their exemplification here.

Laboratories that Pay

The laboratory is not cheap to build, to equip, or to maintain, but no investment pays more. The university laboratories have been responsible for many, if not most, of the discoveries that have made modern life possible. In them chiefly is done the fundamental research of the world; research that has only for its object the increase of knowledge without thought of other gain. But the laboratories of the General Electric Co. have demonstrated to industry also that studies in pure science by Langmuir, Coolidge, and their colleagues pay great dividends where not even their mirage was contemplated. So fully is this now appreciated that the great laboratories of the du Ponts, of the Bell Telephone Co., of the Western Electric Co.,

of the General Electric Co., of the Eastman Kodak Co., of the Bakelite Corporation, of the Union Carbide and Carbon Corporation, of the American Cyanimide Co., and many smaller but equally enlightened corporations, do not hesitate to let their workers seek new knowledge, although no immediate application is in mind. Indeed, one of these corporations has appropriated one million dollars a year for pure research into the unknown, not from philanthropy but because they realise, sooner or later, they will find treasure there a hundred-fold.

Now and then, but not often, the dollar measure can be applied to the output of our laboratories. Over two billion dollars a year are estimated to be added to the world's wealth by the Bessemer process for the production of steel. Another two billions a year are saved in our lighting bill by the nitrogen-filled electric lamp with ductile tungsten filament. The gasoline we use annually to the extent of eighteen billion gallons would cost us at least four billion dollars more had it not been for the laboratory which has doubled output and halved the cost of production. One improvement alone has saved the patentee $300,000,000 in his own practice and brought in $30,000,000 in royalties as well.

Industries built on Laboratory Work

The discovery of mauve by Sir W. H. Perkin was the cornerstone of the industry derived from coal tar, employing thousands of men and more than a billion of capital, filling our homes with colour and our lives with health and beauty. The fixation of the nitrogen of the air first in the laboratory and then in the plant has added immeasurable wealth to the world and has saved the race from otherwise certain starvation. It is practised to-day in all civilised nations. America has plants surpassed by none in efficiency, and is at last quite independent of Chile and, indeed, of all the world for her fertiliser in time of peace and her defence in war. Over 300 tons per day of nitrogen is now being brought into combination from the air in the United States. Our country can now write off the cost of Muscle Shoals without regret, for its very idleness has encouraged industry to instal plants and methods that produce ammonia so cheaply that it is sold to-day at less than half the pre-war price. It is one of the few commodities that has so declined.

Made practically useful by an accidental discovery on a kitchen stove, few commodities have profited more by the laboratory method than has rubber. This material, which so wonderfully modifies the shocks of life, employs to-day in our own country $665,000,000 of capital. The single laboratory discovery of the application of certain substances, known as accelerators, which hasten its vulcanisation, is estimated to save to the users of rubber tyres at least $50,000,000 a year and as investment in plant to the rubber industry of an additional $40,000,000. The demonstration of the germ theory and the development of serum by Pasteur is the greatest of all the accomplishments of the laboratory in history and alone in dollar value to mankind justifies a thousand-fold every expenditure made on laboratories in all the years of their service to mankind.

Modern Laboratory Achievements

Endless examples of the laboratory's accomplishments might be cited. The amplification tubes which make distant and mass communication possible; the liquefaction of air; the accumulation of helium, the rare gases of the atmosphere and the new display lighting they make possible; the X-ray; the radio; radium; the production of sugar, of acetone, of methanol, of lacquer solvents, of paper, and of starch from corn; the conversion of trees into hundreds of products from smokeless powder to silk stockings; conversely, the conversion of sugar cane, of sawdust, and of straw into boards; the hydrogenation of liquid oils to solid fats; of new alloys without number having almost any property in demand; of new light metals for cylinders and airplanes; of new plastics; new varnishes and lacquers; the preservation of food; and innumerable other modern necessities are the children of the laboratory. In short, the laboratory has been the key to the annihilation of space and time, man's great obstacles. We talk to the polar regions, we fly across the oceans, we see through wires, we have harnessed energy to our bidding. All this and more has been conceived in laboratories.

Power Station Equipment Developments

Of Interest to Chemical Engineers

THERE is now being completed the new Kirkstall station at Leeds which will be a notable addition to modern steam generation equipment in Great Britain, including three large boilers with a normal evaporation of 160,000 lb. per hour each, for operation at 490 lb. pressure and 750° F. superheated steam temperature, with pulverised fuel firing. Noteworthy are the inclusion of electrically operated steam valves, and a special design of engine room telegraph.

All these represent the latest practice of Hopkinsons of Huddersfield, and are particularly interesting from the chemical engineering point of view and their application to chemical works generally. For example, the new engine room telegraph, for signalling between the control room and the turbine, of which two sets will be supplied to Kirkstall, is on much improved lines, with a panel and simple push buttons. The ordinary type of engine room telegraph with dials and lever fingers to push round to the different signals, based on the ship's telegraph, has the disadvantage that, in operating, the switchboard attendant has to take his attention off the board. With this panel instrument, however, it is merely necessary to push different buttons, one for each instruction, a much simpler, quicker, and more efficient method. Also each button is operated by a different electric circuit which is more reliable than complicated wiring, while the receiving of the signals by the turbine attendant is always assured as the current used in the corresponding lamp on the turbine house instrument actuates the locking device on the control room instrument.

There are included six 8 in. and one 10 in. electrically-operated valves on the steam mains, while all the boiler mountings and steam and high pressure water valves for the feed pumps are of the same make. The principle of "distance" electrical control from a convenient central panel for steam valves is now beginning to be more and more adopted, the general arrangement of course being a valve, small self-contained motor (A.C or D.C), limit switches, wiring, and panel equipment. Some of the advantages are the immediate closing down of all or any of the valves in an emergency, more accurate control of the whole plant, and elimination for regular use of heavy, complicated, and slow-moving reduction gear for hand operation in the case of large high-pressure valves. In all cases, however, hand working of any valve can always be carried out as the driving motor is automatically disconnected as soon as it stops running. It may be added that "Hopkinson" electrically controlled valves of different types for operation at 800 lb. pressure and 850° F. superheated steam temperature, have been supplied to Synthetic Ammonia and Nitrates, Ltd., at Billingham.

Chemical Matters in Parliament

Detection of Gas

MR. TURNER, Secretary for Mines, in reply to a question on the detection of gas in mines, said all tests for gas by colliery deputies were by law required to be made with a flame safety lamp. He was advised that this was by far the best available instrument for the purpose because it was intrinsically more reliable and had a wider range and variety of functions than any of the other gas-testing instruments as yet devised; and none of these instruments was at all likely to displace the flame safety lamp. Nevertheless, he was anxious to explore fully the question of their practical utility and reliability, more particularly in connection with the position of workmen using electric lamps, which in themselves were useless for detecting mine gases; and he was, therefore, making arrangements with the object of securing more extensive and practical underground trials of electric safety lamps fitted with a device for detecting firedamp. He was glad to say these arrangements were making progress.

Dead Sea Salts Concession

Colonel Howard-Bury (House of Commons, April 17) asked the Under-Secretary of State for the Colonies whether any work had yet been started on the Dead Sea concession.

Dr. Shields replied that he had received no official report in the matter, but he understood that the initial work necessary for the development of the concession was begun immediately on the signature of the agreement.

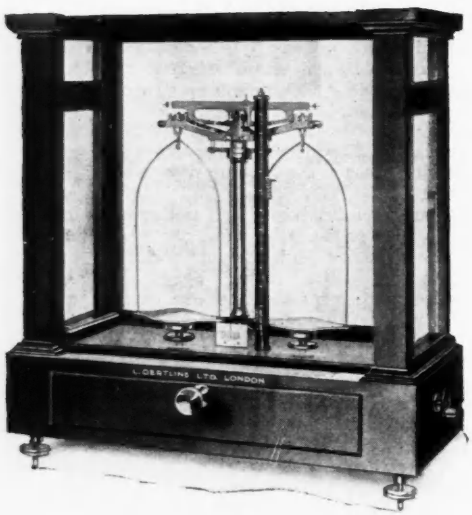
Laboratory Furnishing and Equipment

Some Interesting Products and Improvements

The following notes give an account of some of the varieties of furniture and apparatus required for the equipment of laboratories, and some interesting novelties and refinements of existing apparatus which have lately been introduced by well-known firms.

Chemical Balances

The old-established London firm of L. Oertling, Ltd., continues to extend its range of high grade precision balances to meet new industrial and scientific needs. Attention is now drawn to a new micro-balance shortly to be placed on the market, with a sensitivity of 1/1,000 mg. For general use in the chemical laboratory this firm's Chainomatic Balances are of special interest. The chainomatic principle may be adapted to any of the balance types commonly used in analytical work. In the balance illustrated a sensitivity of 0·0001 grams is secured without the use of weights or riders below 0·1 grams, by the accurate adjustment of a length of fine chain attached



THE CHAINOMATIC BALANCE.

to the beam. This is effected automatically without opening the case, a reading being taken on one Vernier scale—a great saving in time. Accuracy is actually increased, owing to the possibility of error in reading the weight being reduced to a minimum.

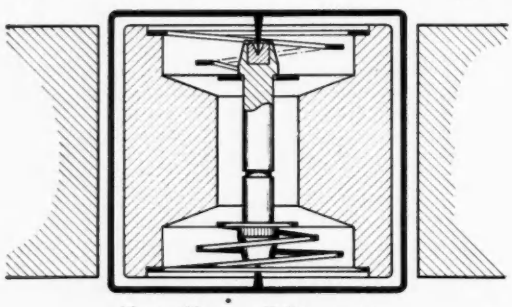
A balance which carries 100 grams and gives rapid readings to 0·01 mg. has many uses in the research laboratory. This is Oertling's Aperiodic balance, which embodies an air-damping device for reducing the period of swing and a powerful microscope for reading the micro-scale attached to the pointer.

A further speciality is the dial-reading Precision Torsion Balance, of which large quantities have been supplied to the textile industry for the accurate weighing of samples of thread to compute the denier. A wide range of capacities are available, the load being from 50 to 500 milligrams and the sensitivity approximately 1/500 of the capacity. Oertling's list of British-made chemical balances embodies, besides these special instruments, a full range of standard balances for all purposes.

Mounting of Pivoted Instruments

Where extremely high sensitivities are required in galvanometers and similar instruments, it is usually necessary to mount the moving coil or other deflecting part on a fine wire or strip suspension. While this is necessary for maximum sensitivity it has the great practical inconvenience of requiring accurate levelling in use and freedom from vibration. It is therefore not surprising that attention is directed to the double pivoted systems, even though high sensitivity is demanded. Pivoting the moving system immediately introduces the danger of error due to pivot friction particularly once the pivot has become damaged or worn in service. The higher the sensitivity and the smaller the moving forces, the greater is this danger of error.

Various systems have been proposed and used for cushioning this system of pivoting so as to prevent damage to the



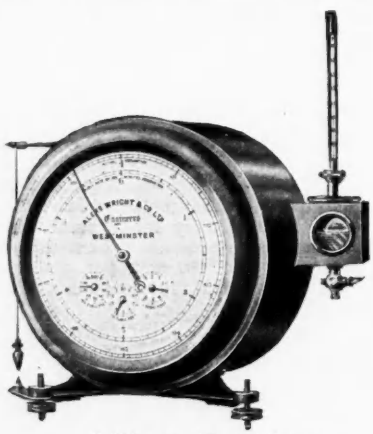
THE "RESILIA" MOUNTING.

delicate points. The most successful design in this direction is that shown in the figure above, and the success appears to be largely due to the fact that the pivot points and conical jewels can never separate in service, and therefore a blow cannot be struck between them.

The pivots, for instance, in a moving coil instrument, are turned inwards and bear in conical jewels which are mounted on either end of a very light column. This column is itself supported upon conical springs which cushion the whole system from shocks and vibration. A distinctive feature appears to be the fact that there is resilient cushioning in all directions. This system is known under the trade name of "Resilia" and is made by the Foster Instrument Company, of Letchworth. It is interesting to note that it is applied with success not only to the very high sensitivity laboratory instruments, but also to apparatus of an industrial type, and actually it has enabled such instruments to be sent through parcels post, a very convincing proof of the efficiency of the spring mounting.

Experimental Test Meters

The accurate measurement of gas volumes has for long been one of the chief businesses of Alexander Wright and Co., Ltd., 1, Westminster Palace Gardens, Westminster, S.W.1, and they have designed a very considerable number of specially made



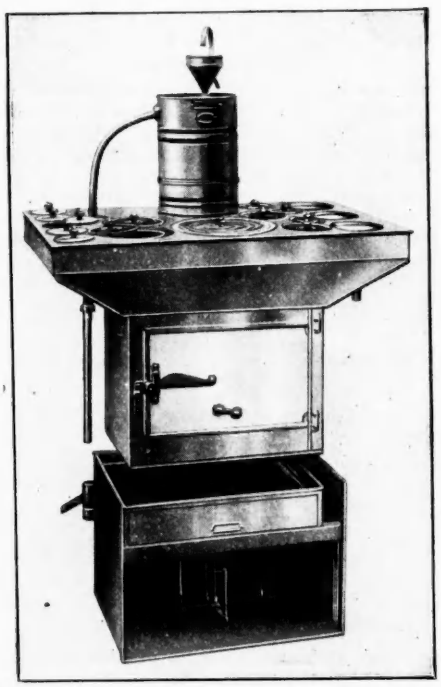
A WRIGHT TEST METER.

meters for various purposes. They can be supplied for any class of experimental work, with dials divided to facilitate reading for any desired series of measurements, in English or metric notation. The experimental test meter (illustrated)

is an accurate measure of gases made in various sizes and used for many laboratory experiments and determinating in photometry, calorimetry and gas analysis. The measuring drum is made of incorrodible metal and the case is supplied in sheet metal, cast iron or porcelain. The accuracy of the instrument can be easily checked and a thermometer is fitted to facilitate correction for atmospheric conditions.

General Equipment

Laboratory apparatus and equipment of all kinds is manufactured by Brown and Son (Alembic Works), Ltd.; Wedmore Street, Holloway, London, N.19, who during the past few years have been entrusted with the work of equipping some of the most important industrial research and school laboratories in the country. Their products have a very high reputation



"SAMBRO" COMBINED OVEN, STILL AND EVAPORATING BATH

for first-class workmanship and the accuracy of results achieved. Besides the complete furnishing of chemical, physical and pharmaceutical laboratories, Brown and Son are prepared to make new and special apparatus to customers' own designs. Their experts will give advice on methods of fitting up and a representative is sent to any part of the kingdom on receipt of appointment. Among their larger apparatus are distilling plant and steam ovens and also petrol-air gas systems for laboratories where coal gas is unobtainable. Water and gas fittings have been specially designed for laboratories and the former are tested up to 200 lbs. per sq. in. pressure. Every fitting is manufactured in the firm's own workshops and is supplied in oxidised or bright finish. Their stills are of patent automatic design and built of hard rolled copper heavily pure tin coated and intended to give constant and daily service. Inquiries are invited for all types of autoclaves, which are manufactured in sizes from a few c.c. to 50 gallons capacity and for any pressures up to 1,000 atmospheres. We illustrate one of the firm's patent "Sambro" removable bottom laboratory ovens.

Epidiascopes

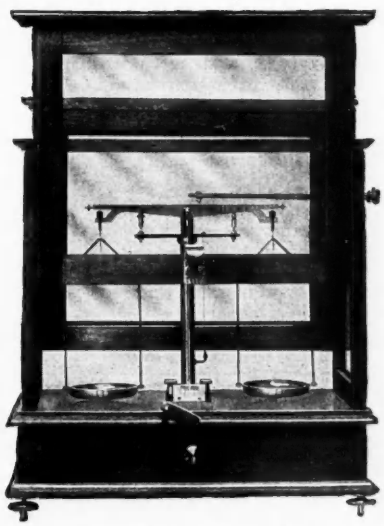
It is interesting to note that while the main body of the Newton Epidiascope Model O, with lighting control for relief projection, is the same as in the Model J, the lantern slide attachment is fitted with a separate body on the front. This arrangement enables three lamps to be used for the opaque projector, the transparent projector in the front being fitted with a separate illuminant. The advantage of three lamps, each of which is controlled by its own switch, is that the object can be lit in various directions, and so produce some very striking effects of relief. The transparent portion on the front can either be fitted for ordinary lantern slides, as shown, or with an open stage front, for either horizontal or vertical work. Such an outfit, of course, gives the lecturer complete equipment for almost any class of work he may desire to carry out during the course of a lecture. A wide variety of optical projection apparatus can be supplied by Newton and Co., 72, Wigmore Street, London, W., and several additions have recently been made to their range of instruments, while others have been considerably improved both in design and construction.

New Zeiss Ikon Epidiascope

Many years' experience in the manufacture of epidiascopes has resulted in the production of the new model Zeiss Ikon epidiascope. In this model the silver surfaced reversing mirror necessary for episcopic projection is totally enclosed in the lamphouse and, therefore, it and the other working parts receive adequate protection from dust and damage. The table is now fitted with an adjustable episcopic stage, upon which the opaque object to be projected is placed in the required position; objects of varying thickness, from a single piece of paper to a book 3 in. thick, can be accommodated. The size of the illuminated aperture for the projection of opaque objects is large, namely, 6½ in. square, and, by mounting the epidiascope body on sliding rails a long book can be projected in sections, so that one is not limited to the actual size of the illuminated aperture. The episcopic lens has the large working aperture of F3·7, which gives a brilliant picture even with high magnifications. Being a perfect anastigmat, the definition is excellent, from the centre to the extreme edges. The manipulation of the instrument is extremely simple and the change over from episcopic to lantern slide projection really resolves itself into the mere turning of a handle. The English distributors are Sands Hunter and Co., Ltd., 37, Bedford Street, Strand, W.C.2.

Balances, Scales and Weighing Machines

Prominent among British manufacturers of balances is William A. Webb, Ltd., of 4 and 5, Skinner Street, London, E.C.1, whose products have achieved a wide reputation in

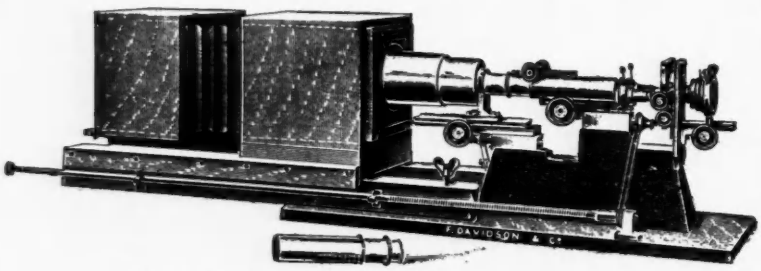


A "WEBB" BALANCE

laboratories and other fields of industry. They include chemical balances, bullion balances, patent platform weighing machines, bankers' scales, etc.

Super-Research Bench

Many months of actual high power photo-micrographic experiments have resulted in the production of the "Davon" Super-Research Bench by F. Davidson and Co., 29, Great Portland Street, London, W.1. The instrument has a unique



THE "DAVON" SUPER-RESEARCH BENCH

design and tests have shown that it marks a distinct forward step in the utilisation of the microscope for critical work. The "super" system is one of high eye-piece magnification, and it is claimed that by being able to employ a microscope objective or a compound microscope as an eye-piece it is employing the highest type of eye-piece. Higher magnification can be employed on any objective than could be employed in the usual way, and this without loss of resolution.

For objects requiring depth of focus the super-microscope is remarkable both for visual observations and photo-micrography and in this direction it is an advance on the ordinary microscope. By the usual high power optical system a big N.A. is used which leads to good definition in a thin plane only, and "out of focus" is reached rapidly. By the super-microscope the "air" image is magnified by another system which can only magnify what is there and depth of focus is there if the aperture of the objective in the "Primary" microscope be small. For determining relationship of structures (easily resolved) to each other it is most useful, as the eye, seeing varying planes in focus, gets a good mental impression of relationship, while individual fine portions can be examined for ultimate detail in the usual way of a big N.A. and nothing but the part considered in focus.

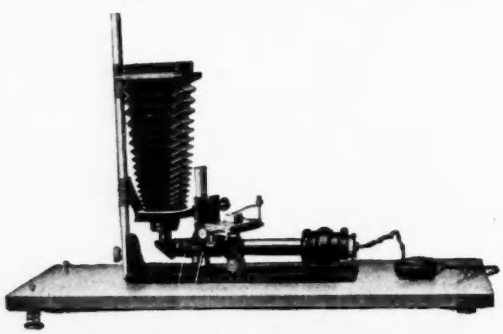
The base of the "Davon" bench, the support for the optical train, forms a single unit and it gives incomparable results, both as regards rigidity and the maintenance of true alignment. Its appearance and finish leaves nothing to be desired.

Metallurgical Microscopes

E. Leitz, of Wetzlar, and 20, Mortimer Street, London, who have been constructing metallurgical microscopes for three decades, are introducing a new Metallographic Microscope MM. The most important feature of this new model is the highly improved illuminating system and the remarkably flat and clear image obtained under all magnifications. The illuminating prism and glass plate are fitted on one sliding axis and can be changed instantaneously. The microscope proper is built on massive lines. As the instrument is constructed after the Le Chatelier type, the stage, which measures seven inches in diameter and has compound motion for traversing the specimens, is horizontal. The coarse and fine adjustment are independent of one another. The apparatus is equipped with an improved arc lamp which can be interchanged with a filament lamp. The transition from ocular observation to photography is effected instantaneously. Magnifications can be obtained from x10 to x3,000 or more. To avoid the sharpness of the photo-micrographs being affected by vibrations, the whole optical bench with camera, microscope and lamp is mounted on a resilient suspension which can be put in and out of action instantly by simply turning a lever. There are no difficulties in manipulating the instrument.

Besides this large metallographic apparatus, there are two other Leitz microscopes for metallurgical work which deserve special mention: one is the Material Testing Microscope M11, a smaller instrument for magnifications up to about x800, with a filament lamp built in. The stage possesses compound movements. A camera can be adapted. This instrument serves not only for testing metal specimens on the stage, but it may also be placed on large flat surfaces or tubes, as the whole body can be rotated at 180 degrees, thus allowing the objective to be turned downwards projecting through an aperture in the base.

The other instrument is a Universal Microscope Stand MO. This instrument is after the style generally used in biology and chemistry. The stage, however, is fitted with rack and pinion motion for coarse focussing the specimen. The square stage is easily interchangeable and can be replaced by a compound mechanical stage or a round graduated revolving stage. The Monocular microscope body can be taken off and replaced by a binocular tube for stereoscopic viewing. This is a valuable arrangement, as the binocular stereoscopic vision



MATERIAL TESTING MICROSCOPE M11

frequently helps to reveal features of the metal structure. There is also the possibility of working with polarised light. In addition, an aligning board may be used which holds the microscope, illuminating stand and illuminant clamped in position. The source of light can be an arc lamp of the same type as that fitted to the large Metallographic Microscope MM, or a special filament lamp of high intensity.

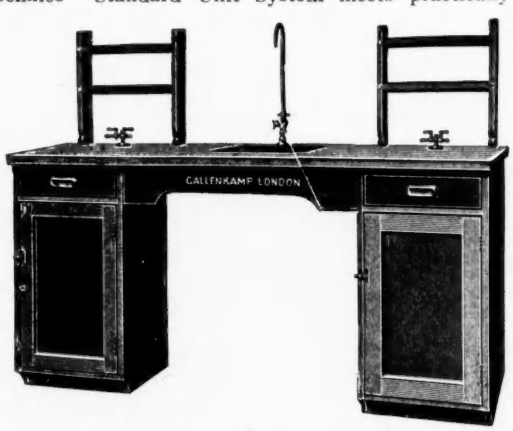
THE LEITZ METALLOGRAPHIC MICROSCOPE MM.

Filter Paper

Postlip Paper Mills, at Winchcombe, Cheltenham, were already old-established when in 1850 they passed into the hands of Evans, Adlard and Co., Ltd., and since that date they have been noted for the manufacture of "Postlip 633" blotting. It is recognised that British mills make finer blottings than other nations, and "Postlip 633" quality has always retained its high standard for finish, and absorbency. Another of their products is filter paper, which has been one of their foremost lines for over half a century. It was difficult to persuade British chemists to use these papers extensively before the war, as German filterings were then much in demand. The outbreak of war, however, gave English makers a chance which had hitherto been denied them, and so effective was the result that German filterings are rarely asked for now in the home markets. Evans, Adlard and Co., Ltd., were one of the first to seize the opportunity, with the result that their trade in Postlip filtering has increased enormously. Postlip filter papers are made for the purpose of analysis, for technical and pharmaceutical work, and for work on sugar and fruit juices, colours and oils, varnishes, heavy liquids, etc.

Standard Laboratory Fittings

Some of the latest developments in laboratory furnishing are to be found in the lists of A. Gallenkamp and Co., Ltd., 17/29, Sun Street, London, E.C.2. A good deal has been done to standardise most modern laboratory fittings, and the "Technico" Standard Unit System meets practically all



A Gallenkamp Laboratory Bench

requirements, saving time and original outlay, extra units being installed as required.

The "Technico" Units are made as follows :—

Cupboard and 2 drawers, 3 ft. 0 in. wide × 1 ft. 9 in. deep.
Cupboard and 1 drawer, 1 ft. 6 in. wide × 1 ft. 9 in. deep.
Tier of 6 drawers, 3 ft. 0 in. wide × 1 ft. 9 in. deep.
Tier of 5 drawers, 1 ft. 6 in. wide × 1 ft. 9 in. deep.

Teak tops, 2 ft. 3 in. wide, are supplied to required lengths. The exterior woodwork of the units is of oak, and is sent out from stock ready for assembly, which can easily be done by unskilled labour, the local plumber making the necessary connections to services. The Units can be arranged in various combinations to pull out from under the bench tops, so that service pipes are easily accessible, allowing bench tops to project at the back about 5 in. from the backs of the cupboards in the wall benches, and 10 in. in double benches. The arrangement can be varied to suit the position of doors, windows, services or flues, etc. The advantages of this system are that by making up in quantities, the best quality work is supplied at a low price, there is a saving of transport, the units are easily refixed in case of removal, and prompt delivery can be arranged. "Technolite," a pure white material, which acids and alkalis cannot stain, is now largely used for the tops of titration benches and in laboratories where clean and sterile conditions are demanded for bench and table tops. "Asbestolite" 1 in. thick is being used for combustion benches, fume cupboards, in preference to slate, as not liable to crack, and can be supplied to the usual sizes.

Chamot Microscope

An instrument of unusual interest for the chemist is the Chamot Chemical Microscope manufactured by the Bausch and Lomb Optical Co. The many and special problems likely to arise in the chemical laboratory have been borne in mind in its design and it finds particular use in investigations involving the identification of inorganic and organic compounds by chemical reactions or optical properties; the measuring of microscopic material, and the examination and control of chemical processes in many industries. Important improvements which have recently been made to the instrument are a new stand, allowing more room for manipulation of specimens, the addition of a circular revolving nosepiece, a rack and pinion substage, a much larger stage, improved attachable mechanical stage, and greatly improved polarising equipment. The new stand has an arm of the long, curved type, the feature of which is that it provides an exceptionally large space and also makes a comfortable handle by which the instrument can be carried without placing any strain upon the adjustments.

The finish is alcohol and reagent proof throughout. All scale graduations except that on the finest adjustment are in German silver and are designed for good visibility. For illumination of ground and polished metal or other opaque specimens the body tube of the *M* microscope can be provided with a vertical illuminator which serves to direct a horizontal beam of light down through the objective and on to that portion of the specimen under observation. It is fitted regularly with a plane clear glass reflector, although a semi-circular mirror reflector can be supplied if required. The reflector is mounted on a shaft with knurled button, on which the position of the reflector is indicated. The reflector can be turned at right angles to the axis of the body tube or removed altogether when the instrument is being used for observation of speciments by substage or oblique illumination. A lamp of special design can be mounted on the body tube in alignment with the side tube of the vertical illuminator. For the illumination of transparent specimens the special lamp may be removed from the bracket and mounted below the stage in conjunction with a substage condenser, or a more powerful light source may be selected for photomicrographic work.

The Dielectrimeter

The importance of frequently testing the dielectric strength of transformer and switch oils is fully appreciated by most transformer users, but it is often neglected because the testing apparatus is expensive and because the test itself is troublesome and takes too long. Yet transformers are being used in ever-increasing numbers and operating at much higher voltages than hitherto, with the result that a convenient instrument is needed for making these tests in the laboratory. The ideal device for testing the dielectric strength of oils and other liquids will be found in the Dielectrimeter, an entirely British made instrument which is being marketed by Walker, Crosweller and Co., of 20, Queen Elizabeth Street, London, S.E.1.

A sample of the oil or liquid to be tested is poured into a special glass cell, and in it are placed two spherical electrodes at a fixed distance apart. In the instrument there are also two movable electrodes which can be separated or brought together at will by turning a handle. When the current is first switched on, it passes through the adjustable air-gap formed by the movable electrodes, but these are then moved further and further apart. Finally a point is reached at which the resistance across the air-gap is greater than the resistance between the electrodes in the oil under test, and the current passes through the oil. The voltage at which this breakdown of the oil occurs is shown directly in volts by a scale on the instrument. The necessary voltage is obtained from a special induction coil working on a 12-volt accumulator.

All the parts of the Dielectrimeter are of excellent workmanship and are built into a 16 in. by 14 in. instrument board, fitted with fuse, voltmeter, ammeter, reversing and battery switches, and the whole is enclosed in a strong wood case. Testing oils with the Dielectrimeter is a matter merely of a few moments, and the results obtained are in accordance with B.E.S.A. specifications.

(*Continued on page* 401)

Chemistry and Chemotherapy of Iodine and Its Derivatives

II—By G. Malcolm Dyson, Ph.D., A.I.C.

We publish this week the second instalment of Dr. Dyson's article on the chemotherapeutic properties of iodine, which have lately been attracting a large and increasing amount of interest, and are the subject of much research. The concluding instalment will follow.

Utilisation of Wet Seaweed

It is quite obvious that the great cost of the extraction of chemicals from seaweed lies in the fuel costs for the drying of the weed prior to carbonisation, and attempts have been made to avoid this by the direct treatment of the wet weed. There are two successful processes; in the Devillers process, which is being operated by the Societe Industrielle de l'Algue Marine, the weed is washed with fresh water, which extracts about 80 per cent. of the iodine. The iodine is then precipitated as cuprous iodide by copper sulphate solution. The difficulty lies in the removal of the very finely-divided cuprous iodide precipitate. This has been effected by adding gelatin and tannic acid to the solution, which precipitate one another with the formation of a flocculent precipitate. This carries the cuprous iodide down with it.

The second direct utilisation process is that which involves the fermentation of the weed, and was elaborated by the Hercules Powder Company. The raw material is the giant weed which grows along the Pacific coast of N. America, and which is harvested by special boats and cut up on board into small pieces. The slurry of weed and water is pumped into large tanks at the plant, and inoculated with tertiary cultures of a suitable bacterium, when fermentation takes place over a period of two weeks. The tanks contain about 50,000 gallons of material, and the gradually increasing amounts of acid formed during fermentation are neutralised by the periodic addition of lime. At the end of the period the solid matter has almost completely gone into solution, and the filtered and neutralised liquid is evaporated in Kestner quadruple effort evaporators.

The first product to separate is a mixture of calcium acetate, propionate, butyrate and valerate, all of which are separated and converted into the corresponding ethyl esters, which may be separated by fractionation. The next solid substance to be formed during the evaporation is a mixture of calcium acetate and potassium chloride. This is distilled for acetone and acetone oil and pure potassium chloride obtained from the residue by water extraction. The concentrated liquor after the separation of these two substances will deposit potassium chloride crystals on further evaporation, and, finally, the mother liquors are worked up for iodine by the slow passage of chlorine through them. The obvious disadvantage of the process is the cost of evaporation, the enormous plant required and the comparative slowness of the fermentation operation. It is very doubtful if the present prices of potassium chloride, acetone and iodine would make the process an economic possibility.

Chilean Iodine

In the Chilean nitrate deposits, the iodine exists in the form of iodates which accumulate in the mother liquors from the purification of the nitrate. In the higher grade material (caliche), the amount of iodine averages 0·15 per cent., while in the "costra," or low grade material, the amount of iodine averages 0·05 per cent. The small amount of iodine present makes it obvious that the recovery of this element can only be carried on as a subsidiary by-product industry.

The amount of iodine which can be conveniently extracted from the raw material is only about 15—20 per cent. of the whole quantity available, since during the purification of the crude nitrate, only a small part of the calcium iodate is converted to the soluble sodium iodate. The general method followed out in the refineries is to extract the nitrate from the raw material by hot water, decanting the clear solution from insoluble impurities and allowing it to cool in tanks from which the deposited crystals may be easily removed. The mother-liquor is used for a fresh extraction, and during the cycle of operations a portion of the calcium iodate becomes converted to sodium iodate which accumulates in the mother liquor. The mother liquor is kept in use until it contains 6–12 gm. of iodine per litre, after which it is worked up for its iodine values.

Method of Extraction from Nitrate Residues

The process of extraction consists in the decomposition of sodium iodate with sodium hydrogen sulphite, iodine and sodium sulphate being produced:—

$$2NaIO_3 + 5NaHSO_3 = 3NaHSO_4 + 2Na_2SO_4 + H_2O + I_2$$

The sodium hydrogen sulphite required for this operation is prepared on the spot by the saturation of a sodium carbonate solution with sulphur dioxide, a bisulphite solution of specific gravity 1·14–1·16 being obtained. The sulphur used is native sulphur from Tacna, and the carbonate is prepared by igniting a mixture of sodium nitrate and powdered coal, since the importation of soda ash involves too great an expense.

The mother liquor and bisulphite liquor are run together into a large wooden vat at such rates that there is always present an excess of the sulphite. The free acid produced is neutralised with sodium carbonate solution, and the excess of sulphite is removed by careful addition of just the necessary amount of mother liquor. The liquids are well mixed and allowed to stand, when the iodine settles out and the waste liquor is removed by decantation. The iodine is washed with water and collected in canvas filter bags, much of its associated water being removed in a hand press. The "cheese" of iodine obtained in this way contains 75–80 per cent. of iodine and about 5 per cent. of salts; the remainder is water.

Purification of Crude Chilean Product

Purification is effected by distillation of the crude iodine from cement-lined retorts, heating being carried out by direct firing, the distillation lasting several days. Condensation of the vapours is effected in large earthenware pipes about 2½ feet in diameter. Several lengths of this pipe are luted together with mud, the whole forming the condenser; at the joints, the luting is not quite complete, a few inches at the bottom being left open through which the condensed water drains away. Practically no iodine is lost in this way. The iodine condenses in the familiar crystalline form, and contains at least 99 per cent. of the element. It is packed in stout oak kegs holding a hundredweight each. These are covered with raw hide, to strengthen the package and to prevent loss by volatilisation.

There is probably no industry in which waste is so characteristic as that concerned with the production of iodine. Only 2 per cent. of the available iodine is extracted, the remainder being thrown away. This is due, in the main, to the fact that the world demand for iodine is only round about 1,000 tons per annum. The serious aspect of the matter lies in the gradual replacement of natural nitrates by those obtained by synthetic means from the atmosphere. It has been claimed that there is no reason why the two industries should not exist together, but experts hold that the natural nitrate industry will ultimately succumb to the competition of its synthetic competitor. If so, what of iodine? It seems that if the nitrate beds are operated only for the sake of their, iodine, then a large increase in price in iodine is to be expected; possibly, in this event, one of the seaweed processes will be resurrected.

Italian Iodine

Until quite recently, Italy has imported all its iodine requirements, to the value of 9·5 million lire annually. For the past two years experiments have been carried out, and brought to a successful conclusion, on the extraction of iodine from the waters of certain wells at Salsomaggiore. The water is pumped from a depth of 400–700 metres and contains 0·55 per cent. of iodine, in addition to chlorides, bromides and sulphates of sodium, magnesium and lithium to the extent of 200 gm./litre. The water is treated with an oxidising agent to liberate the iodine, which is extracted by petroleum on the counter-current system. The iodine is removed chemically from the petroleum and reprecipitated. On an experimental plant producing 10 kg. of iodine per day, a 90 per cent. yield was obtained. The waters are owned by the State, which has

just put down an extraction plant capable of supplying the whole of the domestic requirements of the country.

The general properties of iodine are too well-known to need any enumeration here; and its uses in chemistry are manifold. It finds a limited application as a catalyst for the chlorination of many organic compounds; thus, in the chlorination of methyl anthraquinone, in the preparation of benzanthrone, and in the chlorination of carbon bisulphide with the formation of thiocarbonyl perchloride. The action of iodine in this way has long been a subject for discussion, but it seems fairly clear that the action is due to the formation of iodine trichloride, which is a very active substance, capable of reaction with many compounds unaffected by chlorine alone. Thus, it was found in the chlorination of carbon bisulphide, that iodine trichloride reacted with the carbon bisulphide to give perchloromercaptan and iodine monochloride, which in the presence of further chlorine was reconverted to the trichloride.

In analytical chemistry, iodine is invaluable. Its use in oil analysis for the so-called "iodine value" has greatly facilitated the examination of oil samples, and its use in the titration of reducing agents has been ingeniously adapted to the estimation of almost every known substance. It is not generally appreciated that the "iodine-iodate" reaction is an excellent method of estimating small traces of acid, since the iodine liberated from a solution containing potassium iodate and iodide is proportional to the acid present.

The Alkali Iodides

Much of the iodine which is used for medical and pharmaceutical purposes is used in the form of the iodides of the alkali metals. These iodides are not nearly so easy to prepare as the salts of these elements with hydrochloric or similar acids, since in this case the raw material is the element iodine itself, and not the corresponding hydriodic acid.

The alkali iodides are prepared through the agency of a complex iodide of iron to which the name ferroso-ferric iodide is often given. Its formula corresponds to Fe_3I_8 or $FeI_2.2FeI_3$. The following is an outline of the method used for the production of sodium iodide for pharmaceutical purposes:—Into a wooden vat, fitted with a steam heating coil, is placed chemically pure soda crystals (232 lb.), together with water (40 gall.), and the solution heated by direct steam to boiling. A solution of ferroso-ferric iodide is then run in until the filtered liquid contains the merest trace of free sodium carbonate. The solution is filtered, and evaporated until a thick crust separates out on the surface. The evaporation is conducted in a wrought iron tank with a closed heating coil, and the evaporated liquor is run off into enamelled dishes to crystallise. The iron hydroxide is washed and the washings returned to the plant.

The crystals of crude sodium iodide are then transferred to porcelain draining pans with perforated bottoms, and the mother liquor which runs through is worked up in the following way. It is evaporated until a thick crust separates on the surface, at which point 5 per cent. of its weight of wood charcoal is added together with a little free iodine, and the whole is evaporated to dryness and calcined. The residue from this operation and the crude crystals are united and boiled with water (50 gall.) and made completely neutral with iron iodide liquor. All metallic impurities are eliminated by the addition of hydrogen sulphide water, and the sulphuric acid by the addition of barium iodide. The solution is allowed to stand for 6–12 hours, and then filtered through a bag filter, evaporated and crystallised.

The final drying is done on 40 lb. lots of the crystals by direct heating in open enamelled dishes, and the exact point at which to stop the process is a matter which demands much experience. Often, 0·1 per cent. of sodium carbonate is added during drying to render the final product free from acid. The function of the wood charcoal in the calcination is to remove any iodate which may have been formed. This can also be removed (together with any metallic impurities) by the addition of barium sulphide:—

$$3BaS+4KIO_3=3BaSO_4+4KI$$

The preparation of the ferroso-ferric iodide liquor is carried out thus. The iodine (100 lb.) and water (28 gall.) are stirred together, and iron filings (20 kg.) are scooped over the mixture so that a clear green solution of ferrous iodide is obtained. This is allowed to flow over iodine (140 lb.) contained in a large funnel, the iodine dissolving in the ferrous iodide solution. The solution so prepared contains about 45 per cent. of iodine, and is syphoned over on to fresh iron filings, a quantity sufficient to bring the composition of the dissolved matter to Fe_3I_8 being used. The solution of ferroso-ferric iodide has a density of 65–70° Tw.

Potassium iodide may be prepared in an entirely similar manner, potassium carbonate being used. In this matter it is necessary to note that, in order to get a potassium iodide which complies with the demands of the Pharmacopeia, it is necessary to use a potash free from chlorine. Much Russian potash contains up to 3 per cent. of potassium chloride, and its use for the preparation of potassium iodide is inadmissible.

Iodine in Chemotherapy

Although iodine and its compounds have only been known as such during the last hundred years or so, the use of various iodine-containing products in medicine has been a practice since mediæval times. In the thirteenth century, Villanova recommended a calcined iodine-bearing salt for the cure of scrofulous conditions, and Alexander Seitz, about 1470, prescribed the ashes of marine sponges (which are, of course, rich in iodides) as a useful adjunct to mercury in the treatment of syphilis. A few years after the discovery of the element, Coindet, of Geneva, essayed its use in the treatment of tuberculosis, with, it must be admitted, only the most disappointing of results. The familiar solution of iodine was, it appears, introduced by Lugol in 1829 for the treatment of scrofulous conditions, and has been adopted as an antiseptic lotion ever since.

The simple iodine derivatives of the hydrocarbon series have an anæsthetic action, and even in the cases of solid derivatives such as iodoform an analgesic action is very often noticeable. Iodoform was introduced very early on in the history of antiseptics as a general antiseptic dusting powder for wounds. It has only a moderate efficiency, especially against such organisms as *B. Welchii*, and has not been used so widely of late years. It has two disadvantages, one its very penetrating and clinging smell, and the other its ability to cause "iodism" when used over a prolonged period. The symptoms of "iodism," which include a sense of depression and considerable nervous activity, are very often found to follow on the prolonged use of any iodine compounds.

(To be concluded.)

Metallurgists' Visit to America

Preparations for 1932

PLANS for an American meeting of metallurgists, to be held by the Institute of Metals in the United States and Canada two years hence, are now taking definite shape. The reception committee of the Institute's hosts in U.S.A.—the American Institute of Mining and Metallurgical Engineers—has prepared such an attractive draft programme that nearly 100 British members have already booked for the trip. It is expected that the party from England will be joined by a large proportion of the Institute's 300 American members, as well as by many members from continental countries. The visit will include official meetings of the Institute in New York and joint meetings with allied societies in Detroit and Toronto. Other places to be visited include Pittsburgh, Cleveland, Chicago, Niagara and Montreal. In all of these, works will be thrown open for the inspection of the visitors. The party is expected to leave Southampton on September 3, 1932. The meeting in New York will begin on September 11, and the return will be from Montreal on September 30. An ingenious instalment system has been arranged whereby most of the cost of the trip—estimated at £120—can be paid in advance. The Institute has issued printed banker's order forms under the terms of which £4 monthly can be paid as from May 1, 1930, up to June 1, 1932. Thus members taking advantage of this method of payment will, within three months of the date of sailing, have paid the major portion of the cost of the trip. Persons desirous of taking part in the visit to America should communicate with the Secretary of the Institute of Metals, 36, Victoria Street, London, S.W.1. An election of members is due to be held on May 7, and persons then elected are entitled to membership privileges, in exchange for their first annual subscription, for the extended period ending June 30, 1931.

A Bookman's Column

THE Ernest Benn Press issues this week the third and concluding volume of Alfred B. Searle's comprehensive and learned *Encyclopædia of the Ceramic Industries*, published at nine guineas the set. The work is described as a guide to the materials, method of manufacture, means of recognition, and testing the various articles produced in the clay making and allied industries, including clays, silica, felspar, bricks, tiles, pottery, porcelain, pencils, refractory materials and many others. The matter is arranged in alphabetical order for rapid reference by manufacturers, research workers, students, connoisseurs, and others.

* * *

Mr. Searle, the author, is well well known in the clayworking and allied industries as a leading technical authority. His books on *The Chemistry and Physics of Clays, Refractory Materials* and *Modern Brickmaking* are in high repute. He has now produced a still more important and ambitious work, which embodies, in a compact and convenient form, all that is known respecting the ceramic industries, past and present. For the manufacturer, the merchant, the collector, and the student alike, Mr. Searle's *Encyclopædia*—the outcome of long years of research and experience—will be found indispensable. Nothing like it has been produced before ; it meets an obvious need with singular success.

* * *

Volume XIV of the *Annual Reports of the Society of Chemical Industry on the Progress of Applied Chemistry* (pp. 775, 7s. 6d. to members, 12s. 6d. to non-members) deals with the thoroughness we have come to expect with the chemical developments of the year 1929. These annual volumes, edited by T. F. Burton, B.Sc., illustrate the highest aspect of the Society's work, and leave in a state of indebtedness not only its own members but chemical students and industrialists throughout the world. Although the contributors necessarily vary from year to year, the editor may be congratulated on maintaining a consistently high standard in his selections, and the best praise that can be given to the 1929 volume is to say that it is fully worthy of its predecessors.

* * *

The matter, considering the many branches it covers, is admirably compressed, yet the treatment in each case is adequate. Each chapter is, in fact, a handy text-book on its subject. To review all these in detail is more than may be attempted in this column, but some idea of the volume's comprehensive character is conveyed by the mere list of subjects and authors : "General, plant and machinery," R. Edgeworth-Johnstone ; "Fuel," J. G. King ; "Gas, carbonisation, tar and tar products," H. Hollings and W. A. Voss ; "Mineral oils," Dr. A. E. Dunstan ; "Colouring matters and dyes," Cecil Hollins ; "Fibres, textiles, cellulose and paper," J. C. Withers ; "Bleaching, dyeing, printing and finishing," L. G. Lawrie and N. Chappell ; "Acids, alkalis and salts," C. J. P. Bateson, H. M. Broadhurst and A. Williams ; "Glass," H. W. Howes ; "Refractories, ceramics and cements," Walter C. Hancock ; "Iron and steel," C. O. Bannister ; "Non-ferrous metals," Alan R. Powell ; "Electrochemical and electro-metallurgical industries," H. T. S. Britton ; "Oils, fats and waxes," T. P. Hilditch ; "Paints, pigments, varnishes and resins," members of Oil and Colour Chemists' Association ; "Indiarubber," H. P. and W. H. Stevens ; "Leather and glue," D. Woodroffe ; "Soils and fertilisers," E. M. Crowther ; "Sugars, starches and gums," L. Eynon and J. H. Lane ; "Fermentation industries," H. Lloyd Hind and F. E. Day ; "Foods," L. H. Lampitt ; "Sanitation and water purification," J. H. Coste ; "Fine chemicals, medicinal substances and essential oils," Edgar Stedman ; "Photographic materials and processes," F. M. Hamer. The volume is admirably indexed under both names and subjects.

* * *

The continuous discovery of new substances has enormously increased the difficulties of chemical analysis and other investigations where it is frequently essential to be able rapidly to find out if a mixture contains any bodies which do not come within a definite scheme of compounds. The microscope is one of the best means available for such a rapid examination. The *Handbook of Chemical Microscopy*, by Dr. E. M. Chamot and Dr. C. W. Mason, Vol. I. (London : Chapman and Hall, Ltd. Pp. xiii+474. New York. 22s. 6d.), gives promise that here at last is a book which will enable an average chemist to educate himself in this fascinating but difficult branch of science. The book is one of the most up to date on the microscope. Apart from the more common instruments, it describes ultra-microscopic, micro-spectroscopic, micro-photographic apparatus, microscopic micrometers, etc., and gives a number of details regarding the application of the microscope in the study of crystals. Although the bulk of the applications have been reserved for the second volume, a number of references deal with the most important technical and scientific applications. Considered as a whole, it is a useful modern book, and should prove of considerable service to any chemist who has the money, the time and the will to work on this subject.

* * *

In spite of its size, *Handbuch der Kautschukwissenschaft*, by Professor K. Memmler (Leipzig : S. Hirzel, pp. 766, 1930. 16 Marks), is really a very compact book, as it represents almost an encyclopædia of rubber. Every part is treated with a thoroughness that will be appreciated by chemists and in rubber works and rubber laboratories. The book gives a survey of the various plants from which rubber is produced, the applications of latex, the manufacture of rubber, the chemical composition of latex and rubber, the reactions and compounds of caoutchouc, the theory of its structure, its synthetic preparation, the discussion of problems of vulcanisation, oxidation and ageing. The analytical part, too, is dealt with in quite a satisfactory manner. A large section of the book discusses the physical structure of rubber and the methods of investigation of strength, elasticity, swelling, etc. It also tackles such an ultra-modern proposition as the theory of caoutchouc as a dispersing medium for solid materials. The volume may rightly be described as a handbook of the science of rubber and should be welcome to those who desire a thorough grasp of it.

* * *

Katalytische Reaktionen. Vol. I, by Dr. Horst Bruckner. (Dresden and Leipzig : Theodor Steinkopff, 1930. Pp. 168. 16 Marks), is a specialised work dealing with certain catalytic processes which have been neglected in the usual text books of the subject. Apart from the general uses of catalysts and methods of preparing them, the book deals with catalytic oxidations, hydrations, and dehydrations. When one considers that acetic acid is now produced by a combination of processes of hydration and oxidation of acetylene, the importance of hydration catalysts cannot be overestimated, and any book that collates the knowledge on this subject should be of service to the chemical world. The information given in the book is based on published literature, chiefly patents, and as such demands very critical reading. Nevertheless, it should facilitate the work of investigators of these highly important reactions.

* * *

The Parachor and Valency, by Samuel Sugden, D.Sc., etc. (G. Routledge and Sons, Ltd., pp. 224, 12s. 6d.), is the latest volume in the Twentieth Century Chemistry series, edited by the late Sir William Tilden and Professor J. C. Philip. The author's aim has been to give a connected account of the work which has been carried out on the parachor during the past five years. Since the main interest in this constant centres around its contributions to valency theory, he has thought it desirable to include a discussion of series spectra, dipole moments, and other physical properties which have played an important part in the development of the modern theory of valency. In this way Dr. Sugden has set out clearly the experimental evidence before dealing with the interpretation of valency bonds in terms of electrons. The work throughout is thorough and scholarly.

* * *

W. M. Corse's new volume in the American Chemical Society Monograph Series on *Bearing Metals and Bearings* (Chemical Catalog Co., New York, pp. 382, $7.00) is a valuable bibliography of published knowledge on the subject, with abstracts of selected papers, and a preliminary study intended to aid students to gain a fundamental knowledge of the selection of bearings and bearing metals. The work appears to have been done with care, and will no doubt be found of great use to readers interested in the subject.

Safeguarding Duties on Imported Chemicals, etc.

Official Returns for 1922-29

In reply to questions in the House of Commons as to the value and quantities of safeguarded manufactured goods and non-safeguarded manufactured goods imported into this country and retained for domestic consumption, and the value and quantities of exports of safeguarded manufactured goods and export of non-safeguarded manufactured goods, Mr. W. Graham has circulated a tabular statement giving the figures for the years 1922 to 1929. The following section of the return relates to chemical and other products liable to duty under Part I of the Act. It should be noted that—

Column (3) shows the value of Key Industry goods upon which duty was paid during the year.

Column (4) shows the value of imported goods upon which Key Industry Duty had been paid and in respect of which, on re-exportation during the period specified, the original duty paid was refunded.

Column (5) shows the balance between the figures in columns (3) and (4).

Column (6) shows the total value of goods of these classes imported into this country free of duty. The available information is not sufficient to show what amount of the latter imports may have been re-exported.

Key Industry Duties were first imposed on October 1, 1921, except in the cases of amorphous carbon electrodes, etc., and molybdenum, ferro-molybdenum, etc., which became chargeable from May 1, 1926.

Description. (1)	Year. (2)	(3) £	(4) £	(5) £	(6) £
Optical glass and optical elements, whether finished or not, microscopes, field and opera glasses, theodolites, sextants, spectroscopes, and other optical instruments, and from May 1, 1926, component parts of such optical instruments. (Duty 33⅓ per cent. *ad. val.* to April 30, 1926. Altered to 50 per cent. *ad val.* from May 1, 1926.)	1922	248,958	10,930	238,028	
	1923	309,897	15,490	294,407	
	1924	277,288	23,244	254,044	(a)
	1925	302,821	43,855	258,966	
	1926	363,940	47,337	316,603	
	1927	491,312	80,777	410,535	127,554
	1928	523,328	53,089	470,239	23,747
	1929	503,159	62,474	440,685	17,022
Beakers, flasks, burettes, measuring cylinders, thermometers, tubing and other scientific glassware and lamp-blown ware, evaporating dishes, crucibles, combustion boats, and other laboratory porcelain. (Duty 33⅓ per cent. *ad val.*)	1922	130,410	144	130,266	
	1923	139,190	544	138,646	
	1924	127,800	802	126,998	(a)
	1925	147,382	1,622	145,760	
	1926	137,568	1,246	136,322	
	1927	140,316	1,351	138,965	—
	1928	159,862	881	158,981	—
	1929	177,696	2,783	174,913	525
Galvanometers, pyrometers, electroscopes, barometers, analytical and other precision balances and other scientific instruments, gauges and measuring instruments of precision of the types used in engineering machine shops and viewing rooms whether for use in such shops or rooms or not, and from May 1, 1926, component parts of dutiable scientific instruments. (Duty 33⅓ per cent. *ad val.*)	1922	64,990	2,836	62,154	
	1923	83,042	2,542	80,500	
	1924	95,978	6,181	89,797	(a)
	1925	109,772	8,819	100,953	
	1926	95,119	4,777	90,342	
	1927	153,629	8,971	144,658	—
	1928	144,664	8,433	136,231	104
	1929	203,210	15,306	187,904	12
Metallic tungsten, ferro-tungsten, and manufactured products of metallic tungsten, and compounds (not including ores or minerals) of thorium, cerium, and the other rare earth metals. (Duty 33⅓ per cent. *ad val.*)	1922	35,111	4	35,107	
	1923	48,933	19	48,914	
	1924	39,309	4	39,305	(a)
	1925	55,739	242	55,497	
	1926	20,849	19	20,830	
	1927	36,394	364	36,030	—
	1928	32,896	19	32,877	—
	1929	64,779	324	64,455	—
All Synthetic organic chemicals (other than synthetic organic dyestuffs, colours, and colouring matters imported for use as such, and organic intermediate products imported for their manufacture), analytical reagents, all other fine chemicals (except sulphate of quinine of vegetable origin) and chemicals manufactured by fermentation processes. (Duty 33⅓ per cent. *ad val.*)	1922	400,950	16,592	384,358	
	1923	447,031	21,033	425,998	
	1924	452,317	39,291	413,026	(a)
	1925	495,127	47,645	447,482	
	1926	552,083	58,343	493,740	
	1927	617,738	64,796	552,942	406,845
	1928	646,024	78,172	567,852	464,815
	1929	848,085	70,640	777,445	563,007
Molybdenum, ferromolybdenum and molybdenum compounds and vanadium, ferro-vanadium and vanadium compounds (but not including ores or minerals of molybdenum or vanadium). (Duty 33⅓ per cent. *ad val.* from May 1, 1926.)	1926(c)	7,039	—	7,039	(a)
	1927	10,577	38	10,539	—
	1928	11,811	8	11,803	—
	1929	26,534	—	26,534	—

(a) The value of Empire goods admitted free of duty as fulfilling Imperial Preference conditions is given from 1927 onwards, information prior to that date not being available.

(c) From May 1, 1926.

United Kingdom Production of Synthetic Dyestuffs in 1929

The Board of Trade has compiled the following statement showing the quantities (lbs.) of the various main classes of dyes which were produced in the United Kingdom during the year 1929. The statement has been prepared from returns furnished by the principal British dye makers :—

Category.	Blacks.	Blues.	Browns.	Greens.	Oranges.	Reds.	Violets.	Yellows.	Total.
Direct cotton colours	2,467,943	1,684,257	626,592	249,782	354,992	879,095	147,311	978,753	7,388,725
Acid wool colours	1,417,243	1,366,020	173,357	440,632	725,005	1,752,169	579,531	971,373	7,425,330
Chrome and mordant colours (including Alizarine)	1,782,860	618,806	923,111	82,321	627,677	5,160,149	40,639	379,171	9,614,734
Basic colours	—	489,862	194,775	330,562	103,186	478,428	526,402	427,922	2,551,137
Sulphur colours	5,008,413	504,838	1,020,186	101,285	26,625	113,102	—	89,794	6,864,243
Vat colours (including indigo)	157,297	12,977,825	144,759	440,474	136,650	307,597	306,981	212,118	14,683,701
Dyestuffs for lake making	627	—	673	136,652	1,851	1,566,548	—	156,517	1,862,868
Cellulose acetate silk, oil spirit and wax and miscellaneous colours	472,362	740,046	69,816	24,306	148,476	184,416	68,862	98,709	*5,394,294
Aggregate total	11,306,745	18,381,654	3,153,269	1,806,014	2,124,462	10,441,504	1,669,726	3,314,357	*55,785,032

*Including quantities not separately distinguished.

Imperial Chemical Industries

A Satisfactory Report

THE preliminary announcement by Imperial Chemical Industries, Ltd., was dealt with in THE CHEMICAL AGE on March 29. The full report of the directors for 1929 confirms the figures given, and states that the net profit, after making provision for obsolescence and income-tax, amounts to £5,780,208, which corresponds to £5,212,703 for 1928, an increase on 1928 of £567,505.

The volume of the company's trade again shows a substantial increase when compared with that of previous years. In the United Kingdom, trade was maintained, the depression in certain sections being offset by increased activity in others. Trade in overseas markets continues to show satisfactory progress. Business in soda ash, caustic soda, acids and chlorine products, etc., compares favourably with that of the previous year.

Considerable advances have been made in the development of new dyestuffs. A definite step has been taken to bring about collaboration with the leading authorities on organic research which will make their advice and assistance available to the industry. Sales of dyestuffs in the home market show an increase, which is gratifying in view of the depression in the consuming industries. A large increase in export sales is reported.

There was a satisfactory increase in the home demand for blasting explosives as a result of the improvement in the coal trade of the United Kingdom, and the consumption in foreign markets has been well maintained.

Synthetic Fertilisers and Other Products

The main construction programme at the works at Billingham is now practically completed, and output has been largely increased. Good progress was made in sales at home and in overseas markets, particularly in Australasia, China, India and the Near East, and further steps were taken to consolidate the company's selling organisations in various parts of the world. An important agreement has been concluded with the I.G. Farbenindustrie A.-G., for the purpose of regulating the supply of nitrogenous fertilisers so that it may be more closely related to the demand. It is hoped that this step will prove the forerunner of further international understandings for the rationalisation of the world's supply of nitrogen.

Capital invested in the manufacture of leather cloth, cellulose products, paints, varnishes, etc., shows increased returns, and sales of artificial leather have also increased.

The reorganisation of the metal group has justified expectations of more economical production and a further increase in the trade in these products has taken place. During the year a substantial interest was acquired in the business of Hirsch Kupfer und Messingwerke A.-G., of Eberswalde, Germany, who are recognised as the leading non-ferrous metal manufacturers on the Continent, and close collaboration in technical matters has been established.

Overseas Trade

During 1929 sales of all the company's main products have shown an increase in each of the more important markets, and the established policy of selling through local subsidiary organisations to customers direct has continued to prove successful. In common with the other foreign markets, South America has consumed an increased tonnage of the company's main products. In Australia and New Zealand the company's interests have been consolidated in an Australian company—Imperial Chemical Industries of Australia and New Zealand, Ltd.—with offices in Melbourne. Sales of the company's fertilisers during the past year were in excess of estimates, and further expansion in the near future is anticipated. In Canada the company's interests are developed through Canadian Industries, Ltd.; that company, which is supported by the combined technical and commercial strength of Imperial Chemical Industries and E.I. du Pont de Nemours, has had a successful year. In South Africa, African Explosives and Industries, Ltd., with which the company, in conjunction with De Beers Consolidated Mines, Ltd., is associated, has made further progress, and there seems every indication that it will continue.

The company is continuing to the full its policy of being in the front rank of scientific research, and is achieving excellent results both in the development of new methods and in the improvement of existing manufacturing processes.

The number of employees in the various offices and works of the company's organisation is 60,350, as compared with 54,944 for 1928, notwithstanding the fact that the services of 6,741 men have been dispensed with chiefly owing to the completion of constructional programmes in certain areas. The increase is due partly to an expansion of interests and partly to new constructional work that is still in progress.

The annual meeting takes place on Tuesday next.

Chemical and Metallurgical Corporation

Up-to-Date Plant in Operation

DR. E. P. ANDREAE (chairman) presided at the tenth annual meeting of the Chemical and Metallurgical Corporation, Ltd., held in London on Wednesday, April 16. Moving the adoption of the report, he said the Board felt that in view of the position created in matters the subject of pending litigation, it would be premature at the moment to put forward proposals for a revision of the capital account. After all the disappointments which the company had suffered in other directions, which might well have resulted in their complete extinction, it must give the shareholders some satisfaction to know that continuity of existence was assured in the possession of up-to-date chemical plant which was now in regular operation. There was nothing new, nothing experimental or uncertain about the functioning of this plant. Each unit was designed and erected under the supervision of independent expert firms of world-wide repute.

To provide for all contingencies and for the cost of the works reorganisation a credit of £100,000 had, by the action of certain of the larger shareholders, been placed at the disposal of the company against the issue of 7½ per cent. secured notes for that amount. He was confident that this sum was ample to cover their requirements, and lead them to a state of financial independence. As regarded the company's trading, they had built up for themselves a reputation and a position which ensured to them reasonable participation in the trade. There were certain advantages accruing to the comparatively small producer in a trade largely dominated by organisations of apparently overwhelming size and power. First-class plant, strict economy, meaning low-production costs, and rigid attention to quality and the consumers' needs could still bring profit to the smaller producer and find increasing favour for him. It had become increasingly evident that there was a a general desire for the appointment of a shareholders' committee. In view of the situation which had arisen the Board were prepared to welcome a responsible committee.

Mr. Francis Moore said that the chairman had given the assurance that they would have the support of the directors for the appointment of a committee, and he proposed that a committee be appointed to confer with the Board on the general position of the company and on the events which had led up to the present position, and to report to the shareholders in due course. The chairman of the committee would be Mr. Harold Morland, of Price, Waterhouse and Co. An amendment moved by Mr. Alfred Barnard to co-opt members of his committee to the committee proposed by Mr. Moore was defeated, and Mr. Moore's motion was adopted.

The report was carried unanimously.

£3,000,000 Chemical Contract

I.C.I. Agreement with Soviet

A £3,000,000 credit arrangement for the supply of fertilisers, dyes, chemicals and metals to the Soviet Government has been signed between M. Bron, the new Soviet Trade Delegate to London, and Imperial Chemical Industries, Ltd. It is a two-year agreement and provides also for the giving of technical assistance to the chemical industry of the Soviet Union.

Sir Harry McGowan, President of I.C.I., stated in an interview that they expected to begin exporting to Russia in June next. He was quite satisfied with the contract terms and believed they would be faithfully observed by both parties. The contract was a private one and the British Government were not in any way connected with it.

A New Chemical Refrigerant

Claims for an American Compound

DISCOVERY of a new refrigerant which, it is predicted, will bring about a vast improvement in the world's environment, is announced by the Division of Industrial and Engineering Chemistry of the American Chemical Society. The substance was developed by Mr. Thomas Midgley, jun., known as the discoverer of ethyl gasoline, and Dr. A. L. Henne, a Belgian chemist, in the laboratory at Dayton, Ohio, of the Frigidaire Corporation, a subsidiary of General Motors. Experts from all over the country witnessed a scientific demonstration of the refrigerant by Mr. Midgley and Dr. Henne at a session held on Tuesday, April 8, in Atlanta, Ga., in connection with the seventy-ninth meeting of the American Chemical Society.

"We believe," Mr Billings, Secretary of the Division states, "that this will be an outstanding event in the development of automatic refrigeration." Commercial production, it is thought, will not be practicable for two years. The refrigerant may be applied to sleeping rooms on hot nights; to mines, where operations are now retarded because workers can labour only for brief periods in warm strata at great depths; to submarines, and to situations arising from accidents in which danger from chemicals is threatened.

The refrigerant, yet unnamed, is non-toxic and non-inflammable. "It has been discovered," Mr. Midgley explains, "that several aliphatic compounds containing both fluorine and chlorine can be produced having these features." The new refrigerant is a compound of carbon, chlorine and fluorine, technically known as fluoro-chloro-methane, and is a clear, white liquid, boiling at eighteen degrees below zero F. Eventually, it is expected, this class of the fluoro-chloro methanes will replace present refrigerants, chief among which at present are ammonia and sulphur dioxide.

"It is interesting to note," Mr. Midgley states, "that substitution of fluorine for either hydrogen or halogen reduces both inflammability and toxicity, and a sufficient number of cases have been investigated to justify the acceptance of this fact as a generalisation. It is interesting to observe that this is contrary to accepted opinion based on experience in the inorganic field. It is appropriate to pay homage to Dr. Frederic Swarts, of the University of Ghent, an honorary member of the American Chemical Society, whose pioneer work on the fluorine derivatives forms the basis from which the present production methods have been derived. Were it not for the work of Dr. Swarts it is doubtful if the present work would have been at all possible; it is certain that it would have been delayed for an indefinite period."

Mr. Midgley won distinction by his pioneer work in tetraethyl lead, resulting in the production of the anti-knock compound ethyl gasoline by the Ethyl Gasoline Corporation. This research was done in the General Motors laboratories at Dayton and Detroit. Mr. Midgley graduated from Sibley College of Mechanical Engineering, Cornell University, in 1911, and later he engaged in private research on tyres until 1914. In 1923 he was awarded the William H. Nichols Medal of the New York Section of the American Chemical Society. Dr. Henne, his associate in the development of the refrigerant, went to America from Belgium three years ago to join the General Motors research staff. He received his doctor's degree from the University of Brussels.

"Patents and Trade Marks"

MR. BENJAMIN T. KING, C.I.M.E., explains in a foreword that the reception accorded to previous issues of his brochure on *Patents for Inventions* justifies the publication of this revised and enlarged 18th edition, on the completion of forty-four years' active practice in all that relates to the patenting of inventions, the registration of trade marks and designs, and the protection of copyrights. Incidentally, this issue serves to mark the coming-of-age of King's Patent Agency, Ltd., which was incorporated as a limited company in 1908. The information contained in the booklet is concise, clear and practical; it gives a useful insight into a field that contains many mysteries and pitfalls for the uninstructed layman, and tells the inquirer most of the essential things he wants to know. Readers of THE CHEMICAL AGE, who desire a copy, may obtain one on application to King's Patent Agency, 146A, Queen Victoria Street, London, E.C.4.

Mellon Institute of Industrial Research

A Year's Wide-spread Activities

IN his seventeenth annual report to the board of trustees of the Mellon Institute, Dr. E. R. Weidlein (director) has summarised the activities of the institution during the fiscal year ended February 28, 1930. The sum of $929,109 was contributed by Industrial Fellowship donors in support of research—an increase of $129,025 over the preceding year. The total amount of money appropriated to the Institute by companies and associations for the nineteen years ended February 28, 1930, was $6,749,273.

Throughout the entire fiscal year 71 industrial fellowships, requiring the services of 209 full-time research men, were in operation. Sixty-one industrial fellowships—21 multiple fellowships, and 40 individual fellowships—were active at the beginning of the new fiscal year. Eight are being sustained by industrial associations. The industrial research personnel consists of 21 senior industrial fellows, 88 industrial fellows, 34 full-time fellowship assistants, and a number of part-time assistants.

Especially notable results have been forthcoming from the following investigations: air pollution, bricklaying, carbonated beverages, cooking utensils, food varieties, heat insulation, iodine, laundering, organic synthesis, petroleum production, sleep, and vitrified sewerpipe. Ten fellows completed their research programmes; nine fellowships became active during the fiscal year; five new fellowships have been accepted and their operation will be begun during the early part of the new fiscal year.

The Institute's department of research in pure chemistry has continued its work on acidic carbohydrates occurring in plants and on other problems in the province of sugar chemistry. Of the 61 Fellowships now active, 29 have been in operation for five years or more. Of this number 15 have completed more than ten years of work.

The publications by members of the Institute during the calendar year 1929 included 7 bulletins, 50 research reports, and 59 other papers. Sixteen U.S. patents were issued to Fellows of the Institute. The total contributions to literature for the eighteen years ended January 1, 1930, have been as follows: 15 books; 96 bulletins; 528 research reports; 849 other articles; and 407 U.S. patents. These publications are listed in the Institute's Bibliographic Bulletin No. 2 and its three annual supplements, copies of which will be sent to research directors, science teachers, and librarians upon request.

Acetate Products Corporation

A Hopeful Outlook

PRESIDING at the first annual meeting of the Acetate Products Corporation in London last week, Mr. G. D. Hall (chairman) gave details of the new factory, certain sections of which are already complete. The new site at Croydon had been secured on a 98 years' lease, process machinery had been purchased on the Continent and service machinery in this country.

When the plant was complete, the directors felt confident that it would only be a very short time before they were working to full capacity, as there was evidence in many directions that the output would be quickly and profitably absorbed. He had so far progressed with certain negotiations that he was sanguine of securing contracts for the supply by the Corporation of acetate sheeting to four of the large European glass cartels for use in the manufacture of safety glass. Those contracts called for supplies equivalent to about 50 per cent. of the output capacity of the new factory. So far as ordinary celluloid was concerned, they were still doing a very large business in the manufacture of battery boxes at their Richmond works. They were doing a very satisfactory business in the factoring of a great variety of sheet materials, rods and tubes, particularly non-inflammable materials. He could not give quite such a good report regarding the lacquer section of the business. It had been found necessary to discontinue the use of the formulæ employed, and new formulæ had had to be evolved. The new spraying lacquers had been very successful and were being fairly largely used. After investigation, they had decided that it was in the best interests of the shareholders to dispose of the Leytonstone factory. The sale had realised the original price to the vendors.

Chemical and other Trade Publications

The Properties of "Acticarbone"

DETAILS of the activated carbon, "Acticarbone," for the extraction and recovery of volatile solvents and for purification and refining are set out in Notices circulated by Price, Stutfield and Co., Ltd., 6, Fenchurch Buildings, London, E.C.3, who are the sole representatives for Great Britain and the Colonies of the Société de Recherches et d'Exploitations Pétrolifères of Paris.

The installations are simple, take up little room, are easy to operate and do not interfere with the ordinary processes of manufacture. They can be used, for example, for the extraction and recovery of vapours of benzine, solvent naphtha, petrol, benzol, alcohol, acetone, etc., diluted with air or other gases, in no matter how low a concentration. The Acticarbone, which is made in the form of small, hard granules, has the remarkable property of absorbing and retaining quantitatively in its capillaries all the vapours of volatile solvents, even though these are very diluted by air or by industrial gases. The same carbon is freed from the solvents so absorbed by heating with steam to about 100° C. The process, therefore, consists of repeated operations of absorption and release by steam, and the solvent thus recovered is condensed. The same carbon will serve almost indefinitely for recovery, and it is claimed that according to the size of the plant the cost can be completely amortised in 3-6 months' operation.

The considerable advantages of the plants consist both in the special properties of the activated carbon and in the processes of absorption and regeneration; processes which are industrially applied in a manner eminently simple and practical. The guarantee can be extended, moreover, not only to the installation for recovery by Acticarbone, but also to the *collection* of solvent vapours on the spot from spreading machines, drying ovens, etc., and in consequence the guarantee extends, when this is required, both to collection and recovery.

In most cases the complete purification of industrial or alimentary products can be obtained by filtering with 2 per cent. or even as little as 0·05 per cent. of Acticarbone and in consequence the cost of purification is almost negligible—say a few pence per ton.

Handbook of Emulsions

In *The Handbook of Emulsions*, dealing with Amoa agents, Mr. Wilfred F. Billinghame claims to enable any chemist to prepare for his experiemts and general use just the kind of emulsion he may desire for his special requirements. By research and practical work over a long period, he states, he has made the art of emulsions a process of ease and simplicity, and every oil, fat, wax or grease, whatever its origin, can be emulsified by the aid of Amoa agents. All Amoa emulsions can be made to possess a liking for water and be easily washed out of goods after treatment, or they can be given a dislike for water and so exercise an influence as water rejecters. In over seven years' use on all classes of fibre no case of mildew has been reported arising out of the employment of these emulsions.

Welded Tanks

Further examples of welded tanks and vessels made by Robert Jenkins and Co., Ltd., of Rotherham, are contained in the third series of their booklet, *Welding Makes a Better Job*. Some imposing pieces of chemical plant are illustrated, and it is stated that increased floor space and more highly productive machinery has enabled the firm to approximate an output of 500 tons per month in welded tanks, casings, boilers, cylinders, etc., for many trades. Plants from a few pounds' weight to 20 tons is offered promptly and cheaply.

Transmission Belts

A comprehensive handbook on transmission belting has been produced by Macinlop, Ltd., Manchester. Every aspect of belt drive is covered, and there are chapters on the care of belts, centrifugal tension, endless belts, the relation of plies in a belt to the diameter of the pulleys, and so forth. A detailed description of the manufacture of Macinlop belting is given, from the preparation of the cotton and rubber, through every stage to the final compression and cure. In the section on engineering data graphs and diagrams have been prepared as well as numerous useful tables.

Oxygen Cutting Machines

The new Oxygen Cutting Machines Catalogue of the British Oxygen Co., Ltd., describes and illustrates the complete range of B.O.C. oxygen cutting machines manufactured at their Edmonton works. The 55-in. machine is now the standard machine of the B.O.C. range and supersedes the 42-in. which found much favour in the railway workshops of this country and abroad. Railway, tramway and constructional engineers, who make use of manganese steel rails and joists will find that other machines illustrated on Sheets 155, 155A, 156 and 161 have a very real interest for them, as these have been specially designed for quickly cutting rails, etc., and for taking to the job if required.

Leeds and Northrup Bulletins

Recent publications by the Leeds and Northrup Company include a rewritten edition of Bulletin No. 660, "Metered Combustion Control for Boiler Furnaces" (Gibson System), and Bulletin No. 950, "The Homo Method Applied to Nitriding of Steel." Besides crisp descriptions of the working of the plant concerned, each booklet contains several views of installations and diagrams. Bulletin No. 950 shows how the nitriding furnace is loaded, how it operates, and in general what it can do to improve heat treating.

To the Foreman on the Job is the title of a useful booklet just issued by the Trussed Concrete Steel Co., Ltd., reinforced concrete engineers, of 22, Cranley Gardens, South Kensington. It is intended for the better execution of reinforced concrete work, and the information and instructions given are based on the company's own experience of this form of construction, over a period of 25 years. Aggregates, proportions, tables of weights and measurements and information concerning every phase of construction from start to finish are given, and space is also provided for working memoranda.

"Better Valves" is the title of a brochure published by Gummers, Ltd., Effingham Valve Works, Rotherham, illustrating a new departure in valve construction whereby many advantages are obtained without any increase in the average price. In their "Twintite" plunger valve a fitting has been evolved which is positively steam tight and easy to operate at all pressures, and it is claimed that the bugbear of leakage has been entirely eliminated.

Brochures issued by Herbert Morris, Ltd., Loughborough, include *Savings in Stacking* (Book 577), illustrating the many uses of the Morris stacking machine and "The New Morris Versatile Crane" (Folder 40), dealing with a petrol-electric crane which will travel in any direction.

Recent publications by Crompton Parkinson, Ltd., Guisely, Leeds, include lists dealing with their "Klosd" motor (A 205), d.c. motors and generators (A 302, second edition), direct current switchboards (A 500), controller pattern instruments (A 606) and transformers.

For 1930-1931 Metropolitan-Vickers Electrical Co., Ltd. Trafford Park, Manchester, have again produced a very attractive "Girl Calendar," and the subject photographed well maintains the standard set by her predecessors in the series.

Varnish boiling pots in sheet aluminium and Birmalite alloy, aluminium tanks for rail transportation and aluminium vapour ducts are described in leaflets of Birmal Chemical Engineers, Dartmouth Road, Smethwick.

Monsanto plant and products are dealt with in a booklet entitled *Chemicals of Quality*, issued by the Graesser-Monsanto Chemical Works, Ltd., Victoria Station House, Victoria Street, London, S.W.1.

The new type "Universal" roller conveyors (solid steel rollers) are described in a folder of the Universal System of Machine Moulding and Machinery Co., Ltd., 13, Wilson Street, London, E.C.2.

A folder on the Watson Mills acid surface contact system for the intensive production of sulphuric acid in chambers, has been produced by H. T. Watson, 46, Fairfield Road, Widnes.

A brochure on the Duo-Mass Vibro Conveyor has been published by the Underfeed Stoker Co., Ltd., Africa House, Kingsway, London, W.C.2.

From Week to Week

THE WORLD CONFERENCE of producers of nitrate, Chilean and synthetic, met in Paris on Wednesday, the representatives including Chile, Imperial Chemical Industries and I.G. Farbenindustrie.

BIDEFORD BLACK, LTD., shareholders at a general meeting on Wednesday passed a resolution to increase the capital of the company to £130,000 by the creation of 120,000 additional ordinary shares of 5s. each.

SCOTTISH DYES, LTD., at the Grangemouth Dean of Guild Court on Wednesday, April 16, were granted permission to erect a chemical-house, a coopers' workshop, and an extension to the general workshop buildings, the value of the work representing about £12,500.

"OWING TO THE REDUCTION in dividends received on the company's investments in nitrate shares due to the necessity of the producing companies using their liquid resources to finance the present surplus stocks of nitrate," the directors of the British and South Pacific Trading Co. have decided to defer the consideration of a dividend until the accounts for the year are issued. Last year an interim dividend of 4 per cent. and a final dividend of 6 per cent. were paid.

AT THE MEETING of the Chemical Society at Burlington House on Thursday next papers will be read on "Orientation effects in the diphenyl series. Part VIII. The nitration of 4 : 4^1—difluorodiphenyl," by R. J. W. Le Fevre and E. E. Turner; and "The scission of diaryl ethers and related compounds by means of piperidine. Part IV. Elimination of halogen atoms and scission reactions during substitution processes," by (Miss) D. L. Fox and E. E. Turner.

MR. J. GARNETT LOMAX, H.M. Consul-General at Bogota, will be in attendance at the offices of the Department of Overseas Trade for a few days, commencing April 30, for the purpose of interviewing representatives of United Kingdom firms interested in the export of British goods to the Republic of Colombia. Applications for interviews should be made without delay to the Comptroller-General, Department of Overseas Trade, 35, Old Queen Street, London, S.W.1, quoting reference No. 26617/1930.

A TOTAL of £341,000 has now been spent by the Beet Sugar Factories Committee to ensure that the process effluents are purified before being discharged into rivers, according to a statement by Mr. Alfred Wood on behalf of the Committee. £120,000 was spent on purifying plant when the factories were erected, a further sum of £156,000 has since been spent on improvements, and the measures being taken during the next few months in preparation for the coming manufacturing season will involve a further expenditure of £65,000.

MR. J. VOELCKER, secretary of Synthetic Ammonia and Nitrates, Ltd., Billingham, is leaving for South Africa early in June to take up another important position with the I.C.I. enterprises. He succeeded Mr. P. C. Dickens as secretary in June, 1927. At Teesside Mr. Voelcker has taken a deep interest in the social life of the thousands of employees at the Billingham works, and is chairman of the Billingham Synthonia Recreation Club and also of the Works Hospital Committee. His successor at Billingham will be Mr. Pittar, of London, a former assistant.

THE COLOGNE-NEW YORK BERYLLIUM CO., formed to exploit the deposits of beryllium discovered at Koeflach in the Steiermark, Austria, has been granted the necessary concession by the Austrian Government, and will commence mining operations forthwith. It is anticipated that the daily output will average 150 kilograms (303 lb.) and the metal will be dealt with by means of a new electrical process invented by Dr. Saidler, of Cologne, the president of the company. The company is to establish agencies for the sale of the metal in various countries.

THE SOCIETY OF PUBLIC ANALYSTS will meet at the Chemical Society's Rooms, Burlington House, Piccadilly, London, W.1, on Wednesday, May 7, at 8 p.m., when the following papers will be read: "The Diastatic Activity of Honey," by Dr. L. H. Lampitt, E. B. Hughes and H. S. Rooke; "A New Method for the Separation of Titanium from Zirconium and Hafnium," by Dr. W. R. Schoeller; and "The Composition and Polymerisation of Chinese Wood (Tung) Oil," by E. R. Bolton and K. A. Williams. An informal dinner for members and their friends will be held at St. James's Restaurant at 6.30 p.m.

MAJOR CYRIL FULLARD ENTWISTLE has been appointed a director and chairman of Chemical and Wood Industries, and Sir Alfred Hamilton Grant, a director. A third English director will be appointed in due course.

A COURSE of three lectures on "The Chemical Activities of Micro-Organisms" will be given by Professor Dr. A. J. Kluyver (Professor of Microbology in the Technische Hoogeschool, Delft) at the London School of Hygiene and Tropical Medicine on May 13, 15 and 16.

RESEARCH SCHOLARSHIPS, each of a value not exceeding £100, will be awarded at Manchester Municipal College of Technology in July. They are offered in the first instance for one year, but the Governing Body of the college is willing to renew them for a further two years.

THE FARADAY MEDAL (ninth award) will be presented to Sir Ernest Rutherford at a meeting of the Institution of Electrical Engineers to be held on May 1. The presentation will be followed by the twenty-first Kelvin Lecture, which will be delivered by Mr. R. H. Fowler on "Some Recent Advances in the Electron Theory of Metals."

MR. G. H. FORD, assistant editor of the official journal of the Society of Chemical Industry, has resigned and will shortly take over the managership of a paper mill in Belgium. Dr. W. H. Brindley, of Manchester, who has been appointed his successor, will join the staff immediately after Easter, and take up full duties when Mr. Ford leaves about the middle of May.

THE AMERICAN ENGINEERING COUNCIL announces the appointment of a committee to co-operate in the publication of a new edition of *Who's Who in Engineering*. The function of the Committee, according to the executive secretary of the Council, is "to provide such advice on the qualifications of engineers as will enable the publishers to issue a work which shall be authoritative."

THE LEGALITY of a chemist allowing poisons to be sold from a slot machine outside his shop forms the subject of a friendly action which the Pharmaceutical Society is bringing against one of its Tottenham members. The case which came before Judge Crawford at Wood Green County Court and has been adjourned until May 21, was stated by the Society's representative to affect an "enormously extensive" use of the machines.

THE COST OF LIVING index figure having fallen from 66 per cent. on January to 57 per cent. on April 1, the 80,000 operatives in the dyeing and finishing industry of Yorkshire, Lancashire, Cheshire, Derbyshire, and parts of Scotland who are affected by the sliding scale agreement in the industry will on the first pay day in May suffer reductions in wages varying from 8d. to 2s. 4d. for males and from 7d. to 1s. 4d. for females.

AFRICAN EXPLOSIVES AND INDUSTRIES, LTD. announce that the company's two partners, De Beers Consolidated Mines, Ltd., and Imperial Chemical Industries, Ltd., have agreed to erect a plant at Modderfontein for the manufacture of synthetic ammonia. Plants for the oxidation of ammonia are to be erected at Modderfontein and Somerset West, the total expenditure being half a million sterling. It is expected that the works will be completed in two years.

A PREMATURE EXPLOSION of a quarry blast at Cathkin Quarries, Rutherglen, near Glasgow, resulted, on Wednesday, in the death of James Skinner (35), of the technical department of Nobel's factory, Ardeer, Ayrshire. He was demonstrating a new type of blast when it exploded and caused some twenty tons of rock to fall. One boulder, weighing two and a half tons, fell upon Skinner killing him outright, while two other men received injuries to their feet and suffered from severe shock. Skinner had had a wide experience of collieries and quarries both at home and abroad, and returned home a year ago from Chile to get married.

ON THE OCCASION of the Wedgwood Bicentenary celebrations at Stoke-on-Trent, the Ceramic Society will hold a three days' meeting—May 21 to 23. Fifty-two foreign visitors have announced their intention of being present. On the first day a complimentary luncheon to the visitors will be held in the Town Hall, and later there will be a reception at Sandon Hall, by the Earl of Harrowby, Lord-Lieutenant of the County. The official dinner of the Ceramic Society will take place in the evening. For the commemoration volume over 30 papers have been received. On May 22 the British Pottery Manufacturers' Federation will give a complimentary dinner to the Society's guests. Numerous works visits have been arranged.

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Accepted Specifications

325,440. ALUMINIUM CHLORIDE. Imperial Chemical Industries, Ltd., Millbank, London, N. Bennett, St. Bede's Terrace, Widnes, Lancs., and H. Dodd, Temple Cottage, Glazebrook, Manchester. Application date, May 17, 1929.

Phosgene is passed through crude aluminium chloride to form a liquid compound which is separated from insoluble impurities such as metallic chlorides. Alternatively, aluminium chloride may be formed from bauxite by means of an excess of phosgene. The liquid compound is heated to 60° C. at ordinary pressure to obtain a residue of anhydrous aluminium chloride and recover the phosgene.

325,455. TREATING ZINC ORES. Soc. Anon. La Nouvelle Montagne, Engis, Belgium. International Convention date, January 5, 1929.

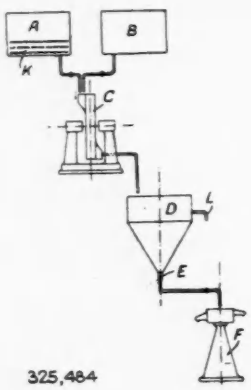
Zinc sulphate solution is added to powdered zinc blende and the product passed through an extrusion press to obtain a granular material in a form suitable for sintering. The zinc sulphate may be obtained by treating by-products of zinc manufacture such as dust, oxides, dross, flue dust, etc., with sulphuric acid.

325,475. NITROUS OXIDE. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 12, 1928.

Ammonia is mixed with oxygen or air in excess of that required to produce nitrous oxide and passed over a catalyst such as platinum, or a mixture of iron oxide with bismuth or manganese oxide, or copper oxide with manganese dioxide and silver. The catalyst is heated to 200°-400° C. and the gas is passed over it at a low speed. The products are practically free from the higher oxides of nitrogen, and nitrous oxide is separated by compression or cooling, or by absorbents or solvents. The gases may be passed in succession through several catalyst chambers, ammonia being added at intermediate stages, whereby a mixture rich in nitrous oxide is obtained. If pure oxygen is employed, the gases are circulated in a closed circuit, some being withdrawn at one part of the circuit and fresh gas added at another point.

325,484. PURIFYING OILS. T. W. Barber, 15, Versailles Road, Anerley, London. Application date, October 8, 1928.

Crude petroleum is heated in a vessel A by a steam coil K, and caustic soda solution passes from a vessel B to an emulsifier



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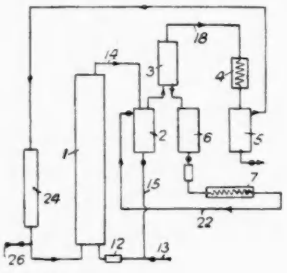
C together with the heated petroleum. The resulting emulsion is drawn off to a vessel D, where it separates into two layers, the upper layer of de-tarred medium being withdrawn by pipe L, and the tar emulsion by pipe E for concentration in a centrifugal machine F.

325,485. DYES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 12, 1928.

Diazotised amino-sulpho-salicylic acids are coupled with such mono-oxybenzenes containing not more than one further nucleus (excepting naphthols) as are free from carboxylic and unsubstituted amino groups, and are substituted in *p*-position to the hydroxy group. Phenols employed include *p*-cresol, hydroquinone-mono-methyl-ether, 2 : 4-dimethyl-phenol, *p*-hydroxy-diphenyl-methane, 4-acetylamino-phenol, and *p*-chlor-*m*-cresol. The dyestuff *p*-amino-sulpho-salicylic acid ($COOH:OH:NH_2:SO_3H = 1:2:5:4$) → *p*-cresol dyes wool yellow, and its chromium compound has increased fastness. A redder shade is produced by the dyestuff *p*-amino-sulpho-salicylic acid → 2 : 4-dimethyl-phenol, and its chromium compound has increased fastness and is suitable for dyeing leather; the copper compound dyes wool yellow. Reference has been directed by the Comptroller to Specifications 2468/99, 13204/15 and 269,934.

325,487. HYDROGENATING AND CRACKING HYDROCARBONS. E. D. Kamm and R. C. Odams, Norton Hall, The Green, Norton-on-Tees, Durham, and Imperial Chemical Industries, Ltd., Millbank, London. Application date, November 15, 1928.

The process is for obtaining motor spirit from coal paste or crude oil. These are destructively hydrogenated, part of the



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products being cracked and the undesired or unchanged liquid products returned to the hydrogenation stage. The raw material is forced by a pump 12 to a hydrogenation tower 1, and the products passed by a pipe 14 to a heavy oil receiver 2 maintained at 350° C. which returns the heavy oil to the pump 12. Vapour passes to a condenser 3, in which middle oil is condensed and then is passed to a receiver 6 maintained at 200° C. This oil then passes to a cracking still 7 under pressure, and returns by pipe 22 to receiver 2. Petrol vapour passes by pipe 18 to a condenser 4 and thence to a receiver 5 at normal temperature. Hydrogen from this receiver returns through washer 24 to the tower 21. An alternative treatment of the middle oil is also described. An example is given of the treatment of an oil containing 86 per cent. boiling above 300° C. and 14 per cent. boiling between 200°-300° C. to obtain a product containing 20 per cent. of petrol and 30 per cent. of middle oil. The latter on cracking contained 37 per cent. of petrol, 45 per cent. of middle oil, and a residue which was returned for rehydrogenation.

325,509. MENTHOL. Howards and Sons, Ltd., Ilford, J. W. Blagden, Apple Tree House, Grove Road, South Woodford, Essex, and W. E. Huggett, 80, Brompton Road, East Ham, London. Application date, November 19, 1928.

Thymol, menthone, piperitone, pulegone, etc., are hydrogenated and the crude synthetic menthol is purified by converting the isomeric alcohols into a mixture of acid esters of a polybasic acid, preferably phthalic acid. The ester mixture is then washed or crystallised from a saturated liquid hydrocarbon substantially free from unsaturated hydrocarbons, and the residue or crystallised product is finally saponified. The saturated hydrocarbons employed include cyclohexance, methyl-cyclohexane, deca-hydro-naphthalene petroleum ether, and other petroleum distillates which are

substantially free from unsaturated constituents. The esters dissolved out may be recovered, saponified, and hydrogenated, as described in Specifications 213,991 and 238,314 (see THE CHEMICAL AGE, Vol. X, p. 522, and Vol. XIII, p. 306).

325,519. DYES. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application dates, November 20, 1928. Addition to 315,910.

Specification 315,910 (see THE CHEMICAL AGE, Vol. XXI, p. 177) describes the preparation of sulphuretted dyes by heating dinaphthalene dioxide with a sulphur halide whereby halogen derivatives are produced in the first stage of the sulphurising process. In this invention, the starting materials are halogen dinaphthalene dioxides which are made as described in Specification 324,017 (see THE CHEMICAL AGE, Vol. XXII, p. 272). These are heated with sulphur or subjected to polysulphide fusion. Examples describe the treatment of di-, tri-, penta-, tetra-, hexa, and deca-chlor and tetra-brom-dinaphthalene dioxide with sulphur. The products dye cotton yellowish red to blackish brown.

325,525. DYES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, August 21, 1928.

Dibenzanthrone or isodibenzanthrone or bromo derivatives are treated in an inorganic diluting medium which may have acid, neutral or alkaline reaction, *e.g.*, water, chloro-sulphonic acid, sulphuric acid, oleum, methyl sulphuric acid, pyrosulphuric acid, per-sulphuric acid, phosphoric acid or liquid sulphur dioxide, with bromine in the presence of halogen transferrers. Suitable halogen transferrers include iodine, sulphur, selenium, iron, copper, antimony and mercury. The liberated acid may be neutralised by adding alkalies or weak acid salts of alkali metals. If chloro-sulphonic acid is the diluting medium and the reaction is effected above 50° C. the dyestuff contains chlorine as well as bromine, but at lower temperatures little or no chlorine is combined. Brominated dibenzanthrones and isodibenzanthrones obtained by any other method may be further brominated by this process. Examples are given of the production of mono-, di-, tri-, tetra-, penta- and hexa-bromo- and higher brominated derivatives of dibenzanthrone and isodibenzanthrone, and also mono-chlor-di-brom, dichlor-tribrom, and dichlor-tetrabrom derivatives.

325,531. HYDROXY CARBOXYLIC ACID ESTERS. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date October 20, 1928. Addition to 300,040.

Specification 300,040 (see THE CHEMICAL AGE, Vol. XIX, p. 543) describes the production of α-hydroxy carboxylic acids from their nitriles, or from the aldehydes or ketones from which the nitriles are obtained. In this invention, the esters of the acids are produced without isolation of the intermediate products by adding an alcohol before or after the formation of the nitrile. An inert solvent is added, capable of dissolving the reagents and products except the ammonium salt, *e.g.*, dioxane, tetrachlorethane, ethyl ether, chloroform or hexahydrobenzene. In an example, lactic acid nitrile is produced from hydrocyanic acid, dioxane, acetaldehyde and caustic soda solution, cyclohexanol is added, hydrogen chloride is passed in, and the mixture boiled, yielding cyclohexanyl lactate on distillation.

325,533. PHOSPHORIC ACID AND HYDROGEN. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 16, 1928.

Phosphorus is treated with water or steam at 650°-700° C. to obtain phosphoric acid, and any lower oxides of phosphorus are converted into phosphoric acid by cooling to 600°C. and maintaining at that temperature for some time in the presence of catalysts such as copper-nickel alloys, fireclay, carborundum, carbon, etc. An example is given.

325,550. DYES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, October 15, 1928. Addition to 318,180.

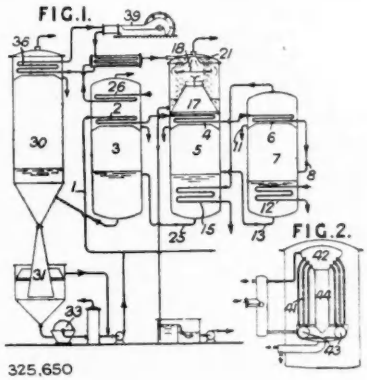
Polynuclear heterocyclic compounds containing a number of negative substituents of the same or different character, such as halogen or nitro groups, are condensed simultaneously or successively with a number of cyclic nitrogenous compounds containing at least one reactive hydrogen atom attached to a nitrogen atom, at least one of the cyclic nitrogenous compounds containing a system of four or more condensed rings, and at least one of the components being vatable. Heterocyclic and cyclic compounds derived from indigo thioindigo, anthraquinone-azines, flavanthrone, anthraquinone-acridones, carbazols, quinolines, pyrazolanthrones, naphthazines, benzene, naphthalene, anthracene, phenanthrene, perylene, pyrene, dianthrones, dibenzanthrone, isodibenzanthrone, dibenzpyrenequinone and anthanthrones may be used. Various solvents or diluents and condensing catalysts may be present. In an example, monochlor-monobromanthraquinone-benzacridone is condensed with aminodibenzanthrone and 1-aminoanthraquinone to obtain a product which dyes cotton in fast grey shades. To obtain monochlor-monobromanthraquinone-benzacridone, 1-amino-2-sulpho-4-bromanthraquinone is condensed with 3-chlor-6-aminobenzoic acid, ring closure to the acridone is effected by means of chlorsulphonic acid, the sulpho group being thereby split off, and the amino group replaced by bromine by way of the diazo compound. Several other examples are also given.

325,557. APPARATUS FOR USE WITH AMMONIA. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, September 15, 1928.

Parts of apparatus which come in contact with ammonia above 600° C., are faced with elementary silicon or substances containing elementary silicon. Thus, calcium cyanamide is produced from ammonia and calcium carbonate at 725° C. in an iron tube lined with a paste of silica gel and water glass containing finely ground silicon and dried at 850° C. A tube of copper-silicon alloy may also be used. The apparatus may also be used for the production of hydrocyanic acid from ammonia and carbon monoxide, and metal nitrides by the action of ammonia on metals.

325,650. CRYSTALLISING SALTS. P. H. Müller, 29, Rumannstrasse, Hanover, Germany. Application date, January 2, 1929.

The solution passes by pipe 1 through preheating coils 2, 4, 6, and then through valve 8 into the first evaporating



325,650

chamber 7. The solution is heated by coil 12 and the vapour condenses on coil 6 and the condensate is withdrawn at 11. The solution then passes through the evaporators 5, 3, at progressively lower temperatures. The evaporator 5 is heated by vapour from the evaporator 7 passing through coil 15, and the evolved vapour is partly condensed by coil 4 and partly removed by a jet condenser 17, 18, 21. Vapour evolved in evaporator 3 is condensed by coils 2, 26, and the concentrated solution passes to a vacuum cooler 30, where it is crystallised. The vapour is removed by a surface condenser 36, consisting of a large tube 44 and smaller tubes 41 between headers 42, 43, and fed with liquid sulphur dioxide or ammonia. The crystals pass to a centrifugal separator 33.

325,641. LITHOPONE. M. Bidaine, Ladenge, Belgium. Application date, December 27, 1928.

Lithopone produced from incompletely purified zinc solutions may have a yellow or reddish-yellow tint, and this is

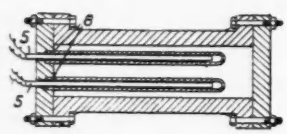
complemented by the precipitation on the lithopone of substances having a blue or greenish blue tint. The colouring substances may be added in the form of a salt to the zinc solutions before precipitation with barium sulphide, and precipitated with the lithopone, or the precipitated lithopone may be mixed with the salt solution which is then precipitated, or the salt solution may be added to the finished lithopone after wet grinding and before filtration, and then precipitated. Chromium sulphate may be used, yielding on subsequent calcination green chromium oxide, or alternatively, zinc and cobalt sulphates which yield a greenish blue compound on subsequent calcination. Sodium or potassium ferrocyanide may also be used.

325,669. SYNTHETIC PERFUMES. O. Y. Imray, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, January 28, 1929.

These compounds are obtained by condensing a Δ^4-unsaturated hydroaromatic aldehyde or an endo compound with a compound containing the group CH_3CO. The hydroaromatic aldehydes are obtained by condensing α-β-unsaturated aldehydes with compounds containing a conjugated double bond system as described in specification 300,130. (See THE CHEMICAL AGE, Vol. XX, p. 53.) In an example, the condensation product of 1:3-dimethyl-butadiene with crotonic aldehyde or acrolein is condensed with acetone in the presence of sodium and methyl alcohol. In another example, 3:6 endoethylene-1:2:3:6-tetrahydro-benzaldehyde is condensed with methylethylketone, and in another example, 3:4:6 trimethyl-1:2:5:6 tetrahydro-benzaldehyde is condensed with acetophenone.

325,678. HIGH PRESSURE REACTION VESSELS. G. T. Morgan and H. Tongue, Chemical Research Laboratory, Teddington, Middlesex. Application date, February 6, 1929.

A reaction vessel for ammonia or methanol synthesis is



325,678

provided with heating tubes 8, having electric heating elements 5, which are externally adjustable without releasing the pressure in the vessel.

325,695. ETHYLENE. J. Y. Johnson, London. From I.G. Farbenindustrie Akt. Ges., Frankfort-on-Main, Germany. Application date, February 22, 1929.

Acetylene and hydrogen are passed over aluminium powder, cerium, or cerium oxide, which may be mixed with active carbon, asbestos or kieselguhr. In an example, a mixture of acetylene 7·2 per cent., and hydrogen 92·8 per cent., is passed over aluminium powder at 320° C. The products contain 6·05 per cent. of ethylene. Some other examples are given.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: —301,311 (I.G. Farbenindustrie Akt.-Ges.), relating to halogen naphthalene ketones, see Vol. XX, p. 105; 302,912 (Ges. für Teerverwertung and H. Kaffer), relating to catalytic hydrogenation, see Vol. XX, p. 189; 302,924 (Metallges. Akt.-Ges.), relating to production of zinc salt solutions, see Vol. XX, p. 189; 303,115 (I.G. Farbenindustrie Akt.-Ges.), relating to alkaline earth cyanides, see Vol. XX, p. 214; 305,202 (Vanadium Corporation of America), relating to vanadium-aluminium silicon alloys, see Vol. XX, p. 39 (Metallurgical Section); 305,593 (I.G. Farbenindustrie Akt.-Ges.), relating to ortho-(aminoaroyl)-benzoic acids and anhydrides, see Vol. XX, p. 384; 306,842 (I.G. Farbenindustrie Akt.-Ges.), relating to 2-mercapto-arylene-thiazole compounds, see Vol. XX, p. 454; 307,343 (I.G. Farbenindustrie Akt.-Ges.), relating to pure benzoic acid, see Vol. XX, p. 454; 309,116 (C. J. Hansen), relating to removal of ammonia and hydrogen sulphide from coal gas, see Vol. XX, p. 547; 309,163 (F. Bensa), relating to perylene tetracarboxylic anhydride, see Vol. XX, p. 547; 309,586 (O. Reuleaux), relating to aluminium alloys, see Vol. XXI, p. 7 (Metallurgical Section); 311,735 (I.G. Farbenindustrie Akt.-Ges.), relating to vulcanisation of rubber, see Vol. XXI, p. 58; 316,542 (Sachtleben Akt.-Ges. für Bergbau und Chemische Industrie), relating to purifying natural heavy spar, see Vol. XXI, p. 314; 317,462 (Soc. Anon. des Distilleries des Deux Sèvres), relating to separation of anhydrous acetic acid from aqueous solutions, see Vol. XXI, p. 362.

Specifications Accepted with Date of Application

301,736. Reactivating catalysts. Soc. l'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude. December 3, 1927.

301,752. Ammoniacal copper cellulose solutions, Manufacture of. K. Hess and C. Trogus. December 3, 1927.

303,527. Diazonium fluoro sulphonates, Manufacture of. I.G. Farbenindustrie Akt.-Ges. January 6, 1928.

304,239. Treating gases with solid substances, Process of. Metallges. Akt.-Ges. January 17, 1928.

304,270. Cellulosic esters, Manufacture of. Kodak, Ltd. January 18, 1928.

305,651. Zinc base alloys, and articles made therefrom. New Jersey Zinc Co. February, 1928.

308,351. Adsorbent, comprising carbon, iron, and iron oxide, Process of making. C. J. G. Aarts, March 22, 1928.

308,713. Anthraquinone derivatives, Manufacture of. Chemical Works, formerly Sandoz. March 27, 1928.

310,534. Aminoimidoazoline series, Manufacture of heterocyclic bases of. I.G. Farbenindustrie Akt.-Ges. April 27, 1928.

312,664. Anhydrous perborates, Preparation of. G. Schoenberg. May 30, 1928.

313,166. Electrolyser for separation of tin from tin salt solutions. L. Ughetti la Corsa. June 9, 1928.

315,818. Catalysts for the production of ketones. Holzverkohlungs-Industrie Akt.-Ges. July 19, 1928.

316,315. Basic dyestuffs, Manufacture of. Durand und Huguenin Akt.-Ges. July 28, 1928.

327,380. Azo dyestuffs, and complex metal compounds thereof, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) October 1, 1928.

327,382. Condensation of aromatic compounds with olefinic compounds. (J. Y. Johnson. *I.G. Farbenindustrie Akt.-Ges.*) November 28, 1928.

327,393. Soaps possessing intensive detergent power, Production of. A. L. Mond. (*I.G. Farbenindustrie Akt.-Ges.*) January 1, 1929.

327,411. Carrying-out condensation reactions with non-aromatic compounds. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) November 27, 1928.

327,415. Acetic acid, wood naphtha, and other products of the distillation of wood and similar carbonaceous substances, Production of. P. Poore. January 2, 1929.

327,417. Products having the properties of resins and waxes, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) September 29, 1928.

327,420. Artificial silk from cellulose esters or ethers, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) October 4, 1928.

327,421. Vapours produced by cracking hydrocarbons, Treatment of. Anglo-Persian Oil Co., Ltd., and A. E. Dunstan. October 4, 1928.

327,443. Destructive hydrogenation. W. R. Tate, H. P. Stephenson, and Imperial Chemical Industries, Ltd. December 31, 1928.

327,444. Removing water from aqueous acetic acid. Kodak, Ltd. (*Eastman Kodak Co.*) January 3, 1929.

327,450. Nitro-halogen quinazolines, Manufacture of. A Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) January 4, 1929.

327,463. Refined hydrocarbon oils and the like, Production of. I.G. Farbenindustrie Akt.-Ges. November 6, 1928. Addition to 300,900.

327,481–2. Dehydration of solid substances such as salts. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) January 17, 1929. 327,482, addition to 1695/29.

327,488. Ammonium sulphate, Production of. O. Piette. January 25, 1929.

327,526. Aralkyl-benzanthrones, Manufacture of. O. Y. Imray. (*I.G. Farbenindustrie Akt.-Ges.*) February 27, 1929.

327,548. Carbon black from carbon monoxide, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) March 11, 1929.

327,570. Melting and deoxidising metals and alloys. W. Reitmeister. April 5, 1929.

327,573. Alcohols, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) April 6, 1929.

327,596. Recovering zinc sulphide. F. Kauba. April 24, 1929.

Applications for Patents

[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]

Ashcroft, E. A. Extraction and recovery of zinc, etc., from ores, etc. 11,159. April 8.

—— Extraction of copper or nickel from ores, etc. 11,663. April 12.

Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of compounds of anthrapyridine series. 11,180, 11,181. April 8.

—— Manufacture of sulphuryl chloride. 11,182. April 8.

—— Tanning. 11,342. April 9.

—— Manufacture of acid wool dyestuffs. 11,437. April 10.

—— Manufacture of coloured rubber masses. 11,438. April 10.

—— Manufacture of water-soluble condensation products. 11,704. April 12.

—— Manufacture of rubber, etc., masses. 11,705. April 12.

Carter, C., and Imperial Chemical Industries, Ltd. Manufacture of bleaching powder. 11,415. April 10.

Coley, H. E. Manufacture of zinc. 11,649. April 12.

Corbillé, H. N. M. Recuperation of oxides of nitrogen in manufacture of sulphuric acid. 11,278. April 9. (Germany, April 23, 1929.)

Du Pont de Nemours and Co., E. I., and Imperial Chemical Industries, Ltd. Coating compositions. 11,266. April 9.

Hempel, A. Conversion of benzenesulphonic acid, etc., into corresponding phenol. 11,236. April 9. (Germany, April 9, 1929.)

—— Production of phenolates. 11,237. April 9. (Germany, April 9, 1929.)

Hey, D. H. Preparation of nuclear alkylated derivatives of aromatic amines, phenols, and acridines. 11,407. April 10.

I.G. Farbenindustrie Akt.-Ges. and Mond, A. L. Plastic compositions. 11,064. April 7.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of valuable hydrocarbons. 11,279. April 9.

—— Manufacture of valuable preparations for treatment of textiles. 11,280. April 9.

—— Manufacture of alcohols. 11,426. April 10.

—— Manufacture of acid wool dyestuffs. 11,437. April 10.

—— Manufacture of coloured rubber masses. 11,438. April 10.

—— Manufacture of alcohols. 11,522. April 11.

—— Manufacture of cyanides of alkaline earth metals. 11,661. April 12.

—— Manufacture of colour lakes. 11,662. April 12.

I.G. Farbenindustrie Akt.-Ges. Manufacture of synthetic resins. 11,035. April 7. (April 30, 1929.)

—— Manufacture of vat dyestuffs of the anthraquinone series. 11,183. April 8. (Germany, April 9, 1929.)

—— Diffusely-reflecting surface. 11,305. April 9. (Germany, May 2, 1929.)

—— Dyeing cellulose esters, etc. 11,306. April 9. (January 25, 1929.)

—— Dyeing cellulose esters, etc. 11,308, 11,309. April 9.

—— Manufacture of vat dyestuffs of the anthraquinone series. 11,343. April 9. (Germany, April 9, 1929.)

Imperial Chemical Industries, Ltd. Production of fertilisers from phosphate rock, etc. 11,100. April 8.

Imperial Chemical Industries, Ltd., Linstead, R. P., and Thomas, J. Anthracene derivatives. 11,154. April 8.

—— Production of mixed fertilisers. 11,155. April 8.

—— Manufacture of agents for protection of textiles, etc., from mildew, etc. 11,267. April 9.

Imperial Chemical Industries, Ltd. Vulcanization of rubber. 11,511. April 11. (United States, April 12, 1929.)

Kristensson, A., and Wintershall Akt.-Ges. Production of potassium carbonate. 11,174. April 8. (Germany, April 16, 1929.)

Metallges. Akt.-Ges. and Mond, A. L. Separating arsenic sulphide etc., from acid liquids. 11,470. April 10.

Moncada, V. Production of hydrocarbons of low-boiling point from carbonaceous materials. 11,147. April 8.

Paige and Jones Chemical Co. Liquid-clarifying agent, etc. 11,053. April 7. (United States, April 15, 1929.)

Pickard, J. A. Filters, etc. 11,491. April 11.

Schering-Kahlbaum Akt.-Ges. Manufacture of therapeutic preparations. 11,439. April 10. (Germany, April 22, 1929.)

Soc. Chimique de la Grand-Paroisse Azote et Produits Chimiques. Synthesising organic compounds containing oxygen. 11,412. April 10. (France, February 7.)

Soc. of Chemical Industry in Basle. Manufacture of basic ethers containing halogen. 10,998. April 7. (Switzerland, April 5, 1929.)

Thorssell, C. T. Production of potassium carbonate. 11,174. April 8. (Germany, April 16, 1929.)

U.S. Industrial Alcohol Co. Manufacture of cellulose acetate. 11,570. April 11. (United States, February 24, 1928.)

[Concluded from page 389)

Spectographs, Polarimeters and Refractometers

Instruments designed to meet the most exacting requirements of chemical and physical laboratories are supplied by Bellingham and Stanley, Ltd., 71, Hornsey Rise, London, N.19. Important additions have been made to their new model, B.S. Direct Reading Wavelength Spectrometer, and it is claimed to be the most efficient and accurate instrument of its kind. They have also introduced spectographs giving all the necessary facilities for spectrum analysis at an extremely low price, and of great value to those engaged in metallurgical control work of every kind. Their No. 1 Quartz Spectograph is of entirely new design and the mounting of the optical elements has been arranged to give a horizontal slit and photographic plate, a method which has several advantages. As the result of much work in the repair of polarimeters during the past ten years, Bellingham and Stanley claim to have eliminated many weak points of the generally accepted design from their own instruments. The absence of the absorbing totally reflecting film in their polariser makes it particularly valuable for use in the ultra violet region of the spectrum. Further improvements have been made in the design of the well-known B.S. Refractometer and the border line and divided scale can be viewed simultaneously with greater convenience than in previous models.

Analytical Reagents

The latest catalogue of " Judex " analytical reagents and laboratory chemicals of the General Chemical and Pharmaceutical Co., Ltd., Willesden, N.W.10, has been considerably enlarged and now contains between three and four thousand items. Each of the analytical reagents " A.R." listed carries the firm's definite guarantee that it conforms to the recognised British " A.R." Standards, and each is tested under the personal supervision of research chemists of experience and high qualifications. Being the actual manufacturers of such a large proportion of the reagents required for analytical work, the firm is at all times prepared to consider the manufacture of the less usual reagents.

Brewing Research

Important Work on Barley and Hops

An outline of the research work now being carried out under the auspices of the Institute of Brewing is contained in a 1930 memorandum which has just been issued, together with a paper by A. H. Burgess of Wye College, on hop drying methods in Czechoslovakia and Bavaria. Many of the problems to be faced, it is stated, are incapable of solution until methods have been worked out for the analytical determination of the special characteristics, in each case, of the raw materials employed, and much work, especially in regard to barley, has to be done before the objects in view are capable of complete attainment.

With regard to hops, however, so much has been discovered of recent years concerning the chemistry of hops and the functions of their constituents, that the time has been brought appreciably nearer when, largely as a result of the work carried out by the Institute at Manchester, it will be possible, not only to grade a series of hops according to the potential preservative value of each, but, what is of equal consequence, to forecast, with accuracy, the actual degree of preservative power which each hop should impart to the finished beer. With the advent of these methods, it will also be possible to open up other lines of inquiry previously rendered impossible by the absence of analytical methods.

In the matter of the drying of hops, it is only comparatively recently that a study has been made of the scientific principles underlying the practice of drying. The experiments on hop drying, carried out under the Research Scheme of the Institute, are considerably advancing our knowledge of the subject, and should prove to be of great assistance not only to makers and users of hop kilns, but also to others engaged on processes involving the drying of plant products. So far, the experiments seem to show that the most efficient kiln to employ will be of a continuous acting type which will eliminate waste of heat and produce a uniformly dried sample.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID, CHROMIC.—1s. 0½d. per lb. d/d U.K.

ACID HYDROCHLORIC.—Spot, 3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.

ACID NITRIC, 80° Tw.—Spot £20 to £25 per ton, makers' works according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA (ANHYDROUS).—Spot, 10d. per lb., d/d in cylinders.

AMMONIUM BICHROMATE.—8½d. per lb. d/d U.K.

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.

BLEACHING POWDER, 35%.—Spot, £7 10s. per ton d/d station in casks, special terms for contracts.

BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £12 10s. per ton; powder, £14 per ton. (Packed in 1 cwt. bags carriage paid any station in Great Britain. Prices quoted are for one ton lots and upwards.

CALCIUM CHLORIDE (SOLID).—Spot, £4 15s. to £5 5s. per ton d/d in drums.

CHROMIUM OXIDE.—9¾d. and 10¼d. per lb. according to quantity d/d U.K.

CHROMETAN.—Crystals, 3½d. per lb. Liquor, £18 15s. per ton d/d U.K.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 3d. to 1s. 8d. per gall. pyridinised industrial, 1s. 5d. to 1s. 10d. per gall.; mineralised 2s. 4d. to 2s. 8d. per gall.; 64 O.P., 1d. extra in all cases.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE CRYSTALS AND GRANULAR.—4⅜d. per lb. nett d/d U.K. spot; ground ½d. per lb. extra.

POTASSIUM CHLORATE.—3¾d. per lb., ex-wharf, London, in cwt. kegs.

POTASSIUM CHROMATE.—8½d. per lb. d/d U.K.

SALAMMONIAC.—Firsts lump, spot, £42 10s. per ton d/d station in barrels. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE, UNGROUND.—Spot, £3 7s. 6d. per ton d/d station in bulk.

SODA ASH, 58° E.—Spot, £6 per ton, f.o.r. in bags, special terms for contracts.

SODA CAUSTIC, SOLID, 76/77%.—Spot, £14 10s. per ton, d/d station.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton, d/d station or ex depot in 2 cwt. bags.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE, REFINED.—Spot, £10 10s. per ton d/d station in bags.

SODIUM BICHROMATE CRYSTALS.—3½d. per lb. nett d/d U.K. spot. Anhydrous ¾d. per lb. extra.

SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM CHROMATE.—3½d. per lb. d/d U.K.

SODIUM NITRITE.—Spot, £19 per ton, d/d station in drums.

SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.

SODIUM SILICATE, 140° Tw.—Spot, £8 5s. per ton, d/d station returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—Spot, £4 2s. 6d. per ton, d/d address in bags.

SODIUM SULPHIDE CONC. SOLID.—Spot, £10 5s. per ton d/d in drums. Crystals—Spot, £7 10s. per ton d/d in sellers' casks.

SODIUM SULPHITE, PEA CRYSTALS.—Spot, £13 10s. per ton, d/d station in kegs. Commercial—Spot, £9 per ton, d/d station.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—7d. to 7½d. per lb. Crude 60's, 2s. 5d. April-June, 2s. 4d. July-Dec. per gall.

ACID CRESYLIC 99/100.—2s. 2d. to 2s. 6d. per gall. Pure, 5s. 6d. per gall. 97/99.—2s. 1d. to 2s. 2d. per gall. Pale, 95%, 1s. 9d. to 1s. 10d. per gall. 98%, 2s. to 2s. 2d. Dark, 1s. 6d. to 1s. 10d. Refined, 2s. 7d. to 2s. 10d. per gall.

ANTHRACENE.—A quality, 2d. to 2½d. per unit. 40%, £4 10s. per ton.

ANTHRACENE OIL, STRAINED, 1080/1090.—4¾d. to 5¼d. per gall. 1100, 5¼d. to 6d. per gall.; 1110, 6d. to 6¼d. per gall. Unstrained (Prices only nominal).

BENZOLE.—Prices at works: Crude, 10d. to 11d. per gall.; Standard Motor, 1s. 5d. to 1s. 6d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall.; Pure, 1s. 10d. to 1s. 11d. per gall.

TOLUOLE.—90%, 1s. 9d. to 2s. 1d. per gall. Firm. Pure, 1s. 11d. to 2s. 5d. per gall.

XYLOL.—1s. 5d. to 1s. 10d. per gall. Pure, 1s. 8d. to 2s. 1d. per gall.

CREOSOTE.—Cresylic, 20/24%, 6¾d. to 7d. per gall.; Heavy, for Export, 6¼d. to 6¾d. per gall. Home, 4d. per gall. d/d. Middle oil, 4¼d. to 5d. per gall. Standard specification, 3d. to 4d. per gall. Light gravity, 1¼d. to 1¾d. per gall. ex works. Salty, 7¼d. per gall.

NAPHTHA.—Crude, 8¼d. to 8¾d. per gall. Solvent, 90/160, 1s. 3d. to 1s. 3½d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 6d. per gall. Solvent 90/190, 1s. to 1s. 2½d. per gall.

NAPHTHALENE, CRUDE.—Drained Creosote Salts, £4 10s. to £5 per ton. Whizzed, £4 10s. per ton. Hot pressed, £8 per ton.

NAPHTHALENE.—Crystals, £12 5s. per ton. Purified Crystals, £14 10s. per ton. Flaked, £14 to £15 per ton, according to districts.

PITCH.—Medium soft, 46s. to 47s. 6d. per ton, f.o.b., according to district. Nominal.

PYRIDINE.—90/140, 3s. 9d. to 4s. per gall. 90/160, 3s. 6d. to 3s. 9d. per gall. 90/180, 1s. 9d. to 2s. 3d. per gall. Heavy prices only nominal.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—6s. per lb. 100%.

ACID BENZOIC.—1s. 8½d. per lb.

ACID GAMMA.—3s. 9d. per lb. 100% d/d buyer's works.

ACID H.—2s. 3d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 6d. per lb. 100% d/d buyer's works.

ACID NEVILLE AND WINTHER.—2s. 7d. per lb. 100% d/d buyer's works.

ACID SULPHANILIC.—8½d. per lb. 100% d/d buyer's works.

ANILINE OIL.—8½d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—8½d. per lb. d/d buyer's works.

BENZALDEHYDE.—1s. 8d. per lb., packages extra, d/d buyer's works.

BENZIDINE BASE.—2s. 4d. per lb. 100% d/d buyer's works.

BENZOIC ACID.—1s. 8½d. per lb. d/d buyer's works.

o-CRESOL 29/31° C.—£3 1s. 10d. per cwt., in 1 ton lots.

m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots d/d.

p-CRESOL 32/34° C.—2s. per lb., in ton lots d/d.

DICHLORANILINE.—1s. 10d. per lb.

DIMETHYLANILINE.—1s. 9½d. per lb., drums extra d/d buyer's works.

DINITROBENZENE.—8d. per lb.

DINITROCHLORBENZENE.—£74 per ton d/d.

DINITROTOLUENE.—48/50° C., 7½d. per lb.; 66/68° C., 9d. per lb.

DIPHENYLAMINE.—1s. 8d. per lb. d/d buyer's works.

a-NAPHTHOL.—1s. 11d. per lb. d/d buyer's works.

B-NAPHTHOL.—£65 per ton in 1 ton lots, d/d buyer's works.

a-NAPHTHYLAMINE.—1s. per lb. d/d buyer's works.

B-NAPHTHYLAMINE.—2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 11d. per lb.

m-NITRANILINE.—2s. 6d. per lb. d/d buyer's works.

p-NITRANILINE.—1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—6½d. per lb, 5-cwt. lots, drums extra, d/d buyer's works.

NITRONAPHTHALENE.—9d. per lb.

R. SALT.—2s. per lb. 100% d/d buyer's works.

SODIUM NAPHTHIONATE.—1s. 6½d. per lb. 100% d/d buyer's works.

o-TOLUIDINE.—8d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—1s. 9d. per lb. d/d buyer's works.

m-XYLIDINE ACETATE.—3s. 1d. per lb. 100%.

N. W. ACID.—4s. 9d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 15s. to £10 5s. per ton. Grey, £16 10s. to £17 10s. per ton. Liquor, 9d. per gall.

ACETONE.—£78 per ton.

CHARCOAL.—£6 to £8 10s. per ton, according to grade and locality.

IRON LIQUOR.—1s. 3d. per gall. 32° Tw. 1s. per gall. 24° Tw.

WOOD CREOSOTE.—1s. 9d. per gall., unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 8d. to 3s. 11d per gall. Solvent, 4s. to 4s. 3d. per gall.

WOOD TAR.—£3 10s. to £4 10s. per ton

BROWN SUGAR OF LEAD.—£38 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 3d. per lb. according to quality; Crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 8d. to 1s. 10d. per lb.

BARYTES.—£5 10s. to £7 per ton, according to quality.

CADMIUM SULPHIDE.—5s. to 6s. per lb.

CARBON BISULPHIDE.—£25 to £27 10s. per ton, according to quantity.

CARBON BLACK.—4 1/16d. to 4¼d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 6d. per lb.

LITHOPONE, 30%.—£20 to £22 per ton.

SULPHUR.—£9 10s. to £13 per ton, according to quality.

SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.

SULPHUR PRECIP. B.P.—£55 to £60 per ton.

ZINC SULPHIDE.—8d. to 11d. per lb

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£37 per ton, ex wharf London, barrels free.

ACID, ACETYL SALICYLIC.—2s. 9d. to 2s. 11d. per lb., according to quantity

ACID, BENZOIC B.P.—2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 3d. to 1s. 4d. per oz.; 50-oz. lots, 1s. 3d. per oz.

ACID, BORIC B.P.—Crystal, £32 per ton; powder, £36 per ton; For one ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—1s. 8½d. per lb., less 5%.

ACID, GALLIC.—2s. 11d. per lb. for pure crystal, in cwt. lots.

ACID, MOLYBDIC.—5s. 3d. per lb. in ¼ cwt. lots. Packages extra. Special prices for quantities and contracts.

ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.

ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 8d. per lb. Technical.—1s. to 1s. 2d. per lb.

ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.

ACID, TARTARIC.—1s. 3d. per lb., less 5%.

ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.

AMIDOL.—7s. 6d. to 9s. per lb., d/d.

AMIDOPYRIN.—7s. 9d. to 8s. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 9d. per lb., according to quantity. 18s. per lb. ex Gum.

AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimated, 1s. per lb.

AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ¼ cwt. lots. Packages extra. Special prices for quantities and contracts.

ATROPHINE SULPHATE.—9s. per oz.

BARBITONE.—5s. 9d. to 6s. per lb.

BENZONAPHTHOL.—3s. to 3s. 3d. per lb .spot.

BISMUTH CARBONATE.—7s. 6d. per lb

BISMUTH CITRATE.—7s. 6d. per lb.

BISMUTH SALICYLATE.—7s. 3d. per lb.

BISMUTH SUBNITRATE.—6s. 6d. per lb.

BISMUTH NITRATE.—Cryst. 5s. per lb.

BISMUTH OXIDE.—9s. 6d. per lb.

BISMUTH SUBCHLORIDE.—9s. 9d. per lb.

BISMUTH SUBGALLATE.—7s. 3d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.

BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 11½d. per lb.; 12 W. Qts. 10d. per lb.; 36 W. Qts. 9d. per lb.

BORAX B.P.—Crystal, £21 per ton; powder, £22 per ton; For one ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain

BROMIDES.—Ammonium, 2s. 6d. per lb.; potassium, 1s. 8d. per lb.; granular, 1s. 5½d. to 1s. 7¾d. per lb.; sodium, 1s. 11d. per lb. Prices for 1 cwt. lots.

CALCIUM LACTATE.—B.P., 1s. 1½d. to 1s. 3d. per lb., in 1-cwt. lots.

CAMPHOR.—Refined flowers, 3s. 3d. to 3s. 4d. per lb., according to quantity; also special contract prices.

CHLORAL HYDRATE.—3s. 1d. to 3s. 4d. per lb.

CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

ETHERS.—S.G. ·730—11d. to 1s. per lb., according to quantity; other gravities at proportionate prices.

FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.

GUAIACOL CARBONATE.—4s. 6d. to 4s. 9d. per lb.

HEXAMINE.—2s. 3d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz

HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.

HYDROQUINONE —3s. 9d. to 4s. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 2s. 5d. per lb.; potassium, 2s. 8½d. per lb.; sodium, 2s. 7½d. per lb., in 1 cwt. lots, assorted.

IRON AMMONIUM CITRATE.—B.P., 2s. 8d. to 2s. 9d per lb. Green, 2s. 10d. to 3s. per lb. U.S.P., 2s. 7d. to 2s. 10d. per lb.

IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.

IRON QUININE CITRATE.—B.P., 8¾d. to 9¼d. per oz., according to quantity.

MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.

MENTHOL.—A.B.R. recrystallised B.P., 15s. 9d. per lb. net; Synthetic, 9s. 6d. to 11s. 9d. per lb.; Synthetic detached crystals, 9s. 6d. to 11s. per lb., according to quantity; Liquid (95%), 9s. per lb.

MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.

METHYL SALICYLATE.—1s. 3d. to 1s. 5d. per lb.

METHYL SULPHONAL.—18s. 6d. to 20s. per lb.

METOL.—9s. to 11s. 6d. per lb. British make.

PARAFORMALDEHYDE.—1s 9d. per lb. for 100% powder.

PARALDEHYDE.—1s. 4d. per lb.

PHENACETIN —3s. 8½d. to 4s. 1d. per lb.

PHENAZONE.—5s. 11d. to 6s. 1½d. per lb.

PHENOLPHTHALEIN.—5s. 11d. to 6s. 1½d. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—98s. per cwt., less 2½ per cent.

POTASSIUM CITRATE.—B.P.C., 2s. 6d. per lb. in 28 lb. lots. Smaller quantities 1d. per lb. more.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.

POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 5½d per lb., spot.

QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins

RESORCIN.—2s. 10d. to 3s. per lb., spot.

SACCHARIN.—43s. 6d. per lb.

SALOL.—2s. 3d. to 2s. 6d. per lb.

SODIUM BENZOATE B.P.—1s. 9d. per lb. for 1-cwt. lots.

SODIUM CITRATE, B.P.C., 1911, AND U.S.P. VIII.—2s. 2d. per lb., B.P.C. 1923, and U.S.P. IX—2s. 6d. per lb. Prices for 28 lb. lots. Smaller quantities 1d. per lb. more.

SODIUM FERROCYANIDE.—4d. per lb., carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—100s. per cwt. Crystals, 5s. per cwt. extra.

SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. 2d. per lb. Crystal, 1s. 11d. to 2s. 3d. per lb.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.

SODIUM SULPHIDE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.

SULPHONAL.—9s. 6d. to 10s. per lb.

TARTAR EMETIC, B.P.—Crystal or powder, 1s. 9d. to 1s. 10d. per lb.

THYMOL.—Puriss, 7s. 6d. to 8s. 6d. per lb., according to quantity. Firmer. Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.

AUBEPINE (EX ANETHOL).—12s. per lb.

AMYL ACETATE.—2s. 6d. per lb.

AMYL BUTYRATE.—5s. per lb.

AMYL CINNAMIC ALDEHYDE.—12s. per lb.

AMYL SALICYLATE.—3s. per lb.

ANETHOL (M.P. 21/22° C.).—6s. 6d. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—2s. per lb.

BENZYL BENZOATE.—2s. 6d. per lb.

CINNAMIC ALDEHYDE NATURAL.—13s. 3d. per lb.

COUMARIN.—12s. per lb.

CITRONELLOL.—10s. per lb.

CITRAL.—8s. per lb.

ETHYL CINNAMATE.—6s. 6d. per lb.

ETHYL PHTHALATE.—2s. 9d. per lb.

EUGENOL.—9s. 6d. per lb.

GERANIOL (PALMAROSA).—20s. per lb.

GERANIOL.—7s. 6d. to 10s. per lb.

HELIOTROPINE.—6s. 6d. per lb.

ISO EUGENOL.—11s. 9d. per lb.

PHENYL ETHYL ACETATE.—11s. per lb.

PHENYL ETHYL ALCOHOL.—9s. 6d. per lb.

RHODINOL.—44s. per lb.

SAFROL.—2s. per lb.

TERPINEOL.—1s. 6d. per lb.

VANILLIN, EX CLOVE OIL.—13s. 6d. to 15s. per lb. Ex Guaiacol, 12s. 6d. to 13s. 9d. per lb.

Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. per lb.

ANISE OIL.—4s. 3d. per lb.

BERGAMOT OIL.—11s. 3d per lb.

BOURBON GERANIUM OIL.—18s. per lb.

CAMPHOR OIL, WHITE.—16os. per lb.

CANANGA.—Java, 9s. 6d. per lb.

CASSIA OIL, 80/85%.—4s. 9d. per lb.

CINNAMON OIL LEAF.—7s. 9d. per oz.

CITRONELLA OIL.—Java, 2s. 8d. per lb., c.i.f. U.K. port; pure, Ceylon, 2s. 8d. per lb.

CLOVE OIL (90/92%).—7s. per lb.

EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%.—1s. 9d. per lb.

LAVENDER OIL.—Mont Blanc, 38/40%, 11s. 6d. per lb.

LEMON OIL.—5s. 3d. per lb.

LEMONGRASS OIL.—4s. per lb.

ORANGE, SWEET.—11s. 3d. per lb

PEPPERMINT.—Wayne County, 14s. per lb.; Japanese, 5s. 9d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, April 24, 1930.

THE demand during the current week has been very slow, owing to the Easter holidays, but prices remain on the whole firm.

General Chemicals

ACETONE.—In steady request at £71 10s. to £80 per ton according to quantity.

ACID ACETIC.—The good demand continues at £36 10s. per ton for Technical 80% and £37 10s. for 80% Edible.

ACID CITRIC.—Still slow at about 1s. 9d. per lb., less 5%.

ACID LACTIC.—In steady demand and firm at £43 per ton for the 50% by weight, pale quality.

ACID OXALIC.—Unchanged at £30 7s. 6d. per ton to £32 per ton according to quantity and in steady request.

ALUMINA SULPHATE.—Firm at £8 to £8 15s. per ton for the 17-18% iron free quality.

ARSENIC.—Unchanged at £15 15s. per ton, free on rails at mines.

BORAX.—In steady request. Recent prices fully maintained.

CREAM OF TARTAR.—Quiet at about 97s. 6d. per cwt.

COPPER SULPHATE.—Steady at £26 10s. per ton in London.

FORMALDEHYDE.—A bit easier at £33 10s. per ton with a steady demand.

LEAD ACETATE.—£41 5s. per ton for white, £40 5s. per ton for brown.

LEAD NITRATE.—Steady at £33 per ton.

LIME ACETATE.—Unchanged.

LITHOPONE.—Continues steady at £19 15s. to £23 per ton, according to grade and quality.

CARBONATE OF POTASH.—£27 per ton for the 96/98%.

PERMANGANATE OF POTASH.—Continues firm, with a good demand at 5½d. per lb.

SODIUM BICHROMATE.—Firm at 3⅜d. per lb., and in good request.

SODIUM HYPO SULPHITE PHOTOGRAPHIC CRYSTALS.—Still in good request at £14 15s. per ton, and Commercial at £8 10s. to £9 per ton.

SULPHIDE OF SODIUM.—Unchanged at British makers' prices.

TARTAR EMETIC.—Unchanged at 11d. per lb.

ZINC SULPHATE.—Remains steady at £13 per ton.

Coal Tar Products

THE market for coal tar products is unchanged, and prices are unaltered.

MOTOR BENZOL.—Quoted at about 1s. 5½d. to 1s. 6d. per gallon f.o.r.

SOLVENT NAPHTHA.—Unchanged, at about 1s. 2½d. to 1s. 3d. per gallon f.o.r.

HEAVY NAPHTHA.—Remains at about 1s. 1d. per gallon f.o.r.

CREOSOTE OIL.—Unaltered, at 3d. to 3½d. per gallon f.o.r. in the North, and at 4d. to 4½d. per gallon in London.

CRESYLIC ACID.—Quoted at 2s. per gallon for the 98/100% quality, and at 1s. 10d. per gallon ex works for the Dark quality 95/97%.

NAPHTHALENES.—The firelighter quality is quoted at £3 10s. to £3 15s. per ton, the 74/76 quality at £4 to £4 5s. per ton, and the 76/78 quality at about £5 per ton.

PITCH.—Remains at a nominal figure of 45s. to 47s. 6d. per ton, f.o.b. East Coast Port.

Nitrogen Fertilisers Market

Sulphate of Ammonia—Export.—The market for sulphate remains unchanged at £8 per ton, f.o.b. U.K. port, in single bags. As this is the consuming season for continental countries, the quantities offered for shipment are comparatively small. Agricultural depression tends to retard growth of consumption, but forward sales have been made to Russia. *Home.*—Agricultural merchants still remain pessimistic, and trade is disappointing. Prices remain unchanged.

Nitrate of Soda.—A satisfactory trade has been steadily maintained, and prices are firm at scale rates.

Latest Oil Prices

LONDON, April 23.—LINSEED OIL was quiet, and 2s. 6d. to 5s. per ton lower forward. Spot, ex mill, £41 10s.; May, £39; May-August, £38 5s.; and September-December, £37 5s., naked. RAPE OIL was quiet. Crude, extracted, £39; technical, refined, £40 10s.; naked, ex wharf. COTTON OIL was steady. Egyptian, crude, £29; refined, common edible, £34; deodorised, £36, naked, ex mill. TURPENTINE was inactive and 3d. per cwt. lower. American, spot, to June, 43s. 6d.; Russian, spot, 40s.

HULL, April 23.—LINSEED OIL.—Spot and April, £40; May-August, £39; September-December, £38 5s. COTTON OIL.—Egyptian, crude, spot, £29; edible refined, spot, £32; technical, spot, £31 15s.; deodorised, spot, £34. PALM KERNEL OIL.—Crude, naked, 5½ per cent., spot, £32. GROUNDNUT OIL.—Crushed-extracted, spot, £33 10s.; deodorised, spot, £34. SOYA OIL.—Extracted and crushed, spot, £30 10s.; deodorised, spot, £34. RAPE OIL.—Crushed-extracted, spot, £36 10s.; refined, spot, £38 10s. per ton, net cash terms, ex mill.

South Wales By-Products

THERE is very little change to report in South Wales by-product activities. The holidays served to weaken an already unsatisfactory demand. Pitch remains quiet and there is no indication of an early buying improvement. Values are unchanged. Motor benzol has a fair and steady market with values unchanged, but creosote remains weak. Heavy naphtha has a slightly better call at from 11d. to 1s. 1d. per gallon, while there is a moderate demand for solvent at from 1s. 3d. to 1s. 5d. per gallon. Refined tars are unchanged, a moderate demand being in evidence for coke-oven and gas works tar, with prices unchanged. Road tar has a fair call at from 10s. to 12s. per 40-gallon barrel. Sulphate of ammonia is in fair and steady request at about £10 2s. per ton. Patent fuel and coke exports are unchanged. Export quotations for patent fuel and coke are unchanged at all South Wales ports.

Scottish Coal Tar Products

BUSINESS has been rather quiet during the week owing to the Easter holidays. Water white products, particularly benzole, have been in good call and prices are a fraction higher. Other products are without interest.

Cresylic Acid.—Values are well maintained in this area although orders are scarce at the moment. Pale 99/100%, 1s. 11d. to 2s. per gallon; pale 97/99%, 1s. 10d. to 1s. 11d. per gallon; dark 97/99%, 1s. 8¾d. to 1s. 9¾d. per gallon; high boiling acid, 1s. 9½d. to 1s. 11½d. per gallon, all f.o.r. works.

Carbolic Sixties.—Any quantities available command the equivalent of 2s. 4d. to 2s. 5d. per gallon for ordinary quality.

Creosote Oil.—Very quiet and quotations are easy, as follows:—Specification oil, 3d. to 3½d. per gallon; gas works ordinary, 2⅞d. to 3⅜d. per gallon; washed oil, 3d. to 3½d. per gallon, all at makers' works.

Coal Tar Pitch.—This being the off season there is very little business being done for export except in packages. Export price is nomina at 47s. 6d. per ton, f.a.s. Glasgow, while home value is easy at about 50s. to 52s. 6d. per ton, ex works.

Blast Furnace Pitch.—There are a few inquiries for export in packages, but business is dull generally. Controlled prices remain at 30s. per ton f.o.r. works for home and 35s. per ton f.a.s. Glasgow for export.

Refined Coal Tar.—There has been a tendency to lower prices to encourage prompt orders. To-day's value is 3¾d. to 4¼d. per gallon f.o.r. works, naked.

Blast Furnace Tar remains at 2¾d. per gallon.

Crude Naphtha.—Quotations are easy at 4d. to 5d. per gallon, ex works.

Water White Products have been in better demand during the week. 90/160 solvent is 1s. 2d. to 1s. 3d. per gallon; 90/190, 1s. to 1s. 1d. per gallon; and motor benzole, 1s. 6¼d. to 1s. 6¾d. per gallon, all free on rails works.

New Benn Books

NEW books announced for early publication by Ernest Benn, Ltd., include the following:—*Spain*, by S. de Madariaga, 21s.; *Sir Arthur Pinero's Plays and Players*, by Hamilton Fyfe, 15s.; *The Camp Book*, by Robert R. Hyde, 3s. 6d.; *In Araby Orion*, by Edward Thompson, 3s. 6d.; *Storm Over Europe*, by Douglas Jerrold, 8s. 6d.; *Cinderella's Country House*, by Mrs. G. P. Lea, 7s. 6d. *Uncanny Tales*, by Marion Crawford, 3s. 6d.; *The Blue Lagoon*, by H. de Vere Stacpoole, 3s. 6d.; *The Unpleasantness at the Bellona Club*, by Dorothy L. Sayers, 3s. 6d.; *The Encyclopædia of Furniture*, compiled by authorities in various countries under the general direction of Dr. Hermann Schmitz, 42s.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing this firm's independent and impartial opinions.*

Glasgow, April 23, 1930.

THE expected activity in the Scottish heavy chemical market has not yet materialised, possibly due to the general holiday. Within the next few days, however, the market will in all probability show improvement. Prices remain steady.

Industrial Chemicals

ACETONE, B.G.S.—£71 10s. to £80 per ton, ex wharf, according to quantity. Inquiry remains satisfactory.

ACID ACETIC.—This material is still scarce for immediate supply, but prices remain unchanged as follows:—98/100% glacial, £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports. 80% pure, £37 10s. per ton, ex wharf; 80% technical, £37 10s. per ton, ex wharf.

ACID BORIC.—Crystals, granulated or small flakes, £30 per ton; powder, £32 per ton, packed in bags, carriage paid U.K. stations. There are a few fairly cheap offers made from the Continent.

ACID CARBOLIC, ICE CRYSTALS.—Quoted 8d. per lb., delivered.

ACID CITRIC, B.P. CRYSTALS.—Quoted 2s. per lb., less 5% ex store, prompt delivery. Rather cheaper offers for early delivery from the Continent.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy; dearsenicated quality, 5s. 6d. per carboy, ex works, full wagon loads.

ACID NITRIC, 80° QUALITY.—£24 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—On offer at same price—viz., 3¼d. per lb., ex store. Offered from the Continent at 3¼d. per lb., ex wharf.

ACID SULPHURIC.—£2 15s. per ton, ex works, for 114° quality, £5 15s. per ton for 168°. Dearsenicated quality 20s. per ton extra.

ACID TARTARIC, B.P. CRYSTALS.—Quoted 1s. 4d. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 1s. 4½d. per lb., less 5% ex wharf.

ALUMINA SULPHATE.—Quoted at round about £7 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 7s. 6d. per ton, c.i.f. U.K. ports. Crystal meal about 2s. 6d. per ton less.

AMMONIA, ANHYDROUS.—Quoted 7½d. per lb., carriage paid. Containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton, powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture, quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Rather easier, and spot material now obtainable at round about £34 per ton, ex wharf. On offer for prompt shipment from China at about £30 per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED.—Quoted £18 per ton, ex wharf, prompt dispatch from mines. Spot material still on offer at £19 15s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £11 per ton, c.i.f. U.K. ports. For Continental material our price would be £10 per ton, f.o.b. Antwerp or Rotterdam.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 12s. 6d. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price, £4 15s. per ton to £5 5s. per ton, according to quantity and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works or £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Now quoted £35 per ton, ex store. Continental material now on offer at about £34 per ton, ex wharf.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 5s. per ton, ex wharf.

LEAD, RED.—Price now £37 10s. per ton, delivered buyer's works.

LEAD, WHITE.—Quoted £37 10s. per ton, c.i.f. U.K. ports.

LEAD ACETATE.—White crystals quoted round about £39 to £40 per ton, ex wharf. Brown on offer at about £2 per ton less.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store. in moderate demand.

METHYLATED SPIRIT.—Industrial quality 64 O.P. quoted 1s. 4d. per gallon, less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4⅜d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance for contracts.

POTASSIUM CARBONATE.—Spot material on offer at £26 10s. per ton, ex store. Offered from the Continent at £25 5s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99¾/100%.—Powder quoted £25 10s. per ton, ex wharf. Crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted at 7d. per lb., ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb., ex wharf.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3⅝d. per lb., delivered buyers' premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality 27s. 6d. per ton extra. Light soda ash £7 13s. per ton, ex quay, minimum 4-ton lots, with various reductions for contracts.

SODIUM CAUSTIC.—Powdered, 98/99%, £17 10s. per ton, in drums, £18 15s. per ton in casks. Solid, 76/77%, £14 10s. per ton in drums; £14 12s. 6d. per ton for 70/72% in drums, all carriage paid buyers' stations, minimum 4-ton lots. For contracts 10s. per ton less.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots. Prices for this year unchanged.

SODIUM NITRATE.—Chilean producers are now offering at £10 2s. per ton, carriage paid buyers' sidings, miminum 5-ton lots, but demand in meantime is small.

SODIUM PRUSSIATE.—Quoted 5¼d. per lb., ex store. On offez at 5d. per lb., ex wharf, to come forward.

SODIUM SULPHATE (SALTCAKE).—Prices 55s. per ton, ex works; 57s. 6d. per ton, delivered, for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption. Solid, 60/62%, £9 15s. Broken, 60/62%, £10 15s. per ton. Crystals, 30/32%, £7 17s. 6d. per ton, all delivered buyers' works on contract, minimum 4-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £9 5s. per ton; ground American, £9 5s. per ton, ex store.

ZINC CHLORIDE, 98%.—British material offered at round about £20 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £10 per ton, ex wharf.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

British Standard for Nickel

THE British standard specifications for non-ferrous metals and alloys have recently been extended by the issue of two specifications relating to nickel. The first, No. 374—1930, "Nickel-Copper (Cupro-Nickel) Sheets and Strips," standardises sheets and strips of four different chemical compositions. In this specification the physical properties of the material are laid down, tensile and bend tests being prescribed, while tolerances on thicknesses are specified for sheets and strips of various widths and gauges. The second specification, No. 375—1930, "Refined Nickel (Grade A)," provides for a nickel of 99 per cent. purity.

The desirability of preparing specifications for other non-ferrous nickel alloys is shortly to receive the attention of the appropriate committee of the Association.

Copies of these two specifications may be obtained from the British Engineering Standards Association (Publications Department), 28, Victoria Street, London, S.W.1, price 2s. 2d. each, post free.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, April 24, 1930.

After a complete suspension of business during the holiday period, the chemical market on this centre opened on a very quiet note on Tuesday, and it is unlikely that things will be back to normal before next week, as a number of the chemical-consuming works in the district have had an extended holiday. For the most part buying interest since the resumption has been on a restricted scale and has related mainly to small parcels for prompt or early delivery. With regard to prices, signs of weakness are to be noted in respect of one or two sections, but there is no indication of general departure from the firmness that has characterised the market of late.

Heavy Chemicals

A moderate business is going through in the case of bichromate of soda, values of which are fully maintained at 3⅜d. per lb., less 1 to 2½ per cent. discount. Chlorate of soda is steady, although only in quiet demand at the moment at from £25 to £27 per ton, ex store. Bicarbonate of soda is moving in fair quantities, and there has been no change in the position of prices, offers being on a contract basis of £10 10s. per ton. Caustic soda meets with a moderate amount of inquiry, with contract quotations well held at from £12 15s. to £14 per ton, according to quality. Glauber salts are rather a dull section at round £2 15s. per ton. Phosphate of soda is quoted to-day at about £11 10s. per ton for the dibasic material, but business has been on quiet lines. In the case of hyposulphite of soda values are steady at from £15 to £15 10s. per ton for the photographic quality and round £9 for the commercial, but sales this week have been slow. Alkali is in moderate request and quotations are firm at £6 per ton in contracts. Saltcake keeps steady in the neighbourhood of £3 per ton, though no big weight of business in this material has been reported during the past week. With regard to sulphide of sodium, the demand for this has been rather quiet, but there has been little change in the basis of prices, current offers being at round £9 10s. per ton for the 60–65 per cent. concentrated solid quality and £8 for the commercial product.

Chlorate of potash has been in limited request, with prices ranging from about £26 to £28 per ton, according to quantity. Caustic potash has been on the quiet side, but offers of this are still at about £31 per ton. Yellow prussiate of potash keeps firm at from 6¾d. to 7¼d. per lb., according to quantity, and inquiry for this material continues on a fairly satisfactory scale. Permanganate of potash is steady, although not much in the way of buying is going on at the moment; the B.P. quality is quoted at 5½d. per lb. and the commercial at about 5¼d. Carbonate of potash is quiet but unchanged on the week at round £26 per ton. Bichromate of potash is firm on the basis of 4⅜d. per lb., and moderate sales are being made.

Sales of arsenic are still of modest proportions and values are easy in tendency at about £15 15s. per ton at the mines for white powdered, Cornish makes. Sulphate of copper is only a very moderate market and at round £25 10s. per ton, f.o.b., prices at the moment are uncertain. Inquiry for the acetates of lime has been inactive this week, with offers of the grey material at about £15 per ton and of the brown at £7 5s. The lead products are slow, with current values of nitrate at £32 per ton and of white and brown acetate at £38 and £37.

Acids and Tar Products

Neither citric nor tartaric acid is attracting much attention just now, although values of both have been about held at the recent cuts, citric being obtainable at round 1s. 8¼d. per lb. and tartaric at 1s. 3d. Oxalic acid is in quiet demand, with prices steady at £1 12s. 6d. per cwt., ex store. There is a fair call for acetic acid, values of which are firm at £36 10s. per ton for the 80 per cent. commercial quality and £66 per ton for the glacial.

Conditions have been dull practically throughout the by-products section. Pitch, however, is still quoted on the basis of 47s. 6d. per ton, f.o.b., with creosote oil offering at from 3⅝d. to 4¼d. per gallon, naked, at works. Solvent naphtha is steady and in moderate request at 1s. 2½d. per gallon. Crude carbolic is quoted at 2s. 5d. to 2s. 6d. per gallon, naked, with crystals quiet at round 7d. per lb., f.o.b.

Company News

Verein fur Chemische Industrie A.-G. (Chemical Industry Union), Frankfort.—A dividend of 7 per cent, is proposed by the directors on a capital of Rm. 6,500,000.

Einstein's Electro-Chemical Process.—The accounts covering the period from the company's incorporation in December, 1928, to December 31, 1929, state that there is a debit balance on profit and loss due to the fact that the period covered by the accounts was one of equipment and development and not of commercial production. The company's processes required the manufacture of special plant and, owing to delays in delivery beyond the company's control, the factory at Slough was only in partial operation at the date of the closing of accounts. A considerable amount of expenses incurred during the year will therefore be non-recurring. The factory at Slough has now been fully equipped and work is in active progress. The factory at Acton has been punctually completed, and satisfactory arrangements for the disposal of products from that factory have been made. In spite of delay, it is the considered opinion of the board that the prospects are satisfactory. The profit and loss account shows development and office expenditure and directors' fees absorbed £27,145, less sale of investment and transfer fees £5,591, leaving a deficit of £21,554.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Egypt.—The Physical Department, Ministry of Public Works, Cairo, is calling for tenders, to be presented in Cairo by June 2, for the supply of weighing machines and Beranger balances. (Reference No. B.X. 6317.)

France.—A firm in Aubenas (Ardeche) desire to represent manufacturers of chemical products and pharmaceutical specialities. (Reference No. 321.)

India.—The Indian Stores Department (Engineering Branch), Simla, is calling for tenders, to be presented in India by May 1, 1930, for the supply and erection at site of: (*a*) One combined oil eliminator and make-up water-softener plant; and (*b*) one recording-type water meter to record the output of the oil eliminator and water-softener plant. (Order No. N. 10975.) (Reference No. A.X. 9412.)

Imperial Institute Research

The report of the Imperial Institute for 1929, issued by the Director Sir William Furse, records a definite increase both in the research work of the Institute and in visits of the public. Closer *liaison* was made with the Empire Marketing Board through an interchange of representatives on the various technical committees, while the Institute has also been able to co-operate with the Forest Products Research Laboratory at Princes Risborough, and the Rothamsted Experimental Station of the Imperial Bureau of Soil Science.

The New Zealand Department made a specific inquiry regarding the deterioration of Romney wool and the best means of eliminating unevenness of fibre and coarseness. Sir Frederick Aykroyd and Dr. S. G. Barker, Director of the British Research Association for the Woollen and Worsted Industries, made separate reports, tracing the faults in the wool to cross-breeding between coarse-woolled and fine-woolled breeds of sheep. Investigations were also made into the use of bagasse or megasse (the fibrous residue of sugar-cane) from Trinidad for making artificial silk. Otto of roses from Cyprus and 26 specimens of Empire-grown tobacco were among the other products tested, while the Intelligence Section of the Department, which dealt last year with 1,241 inquiries against 1,230 in 1928 and 1,022 in 1927, had to answer inquiries such as that from the tobacco-planters of Southern Rhodesia concerning the possibilities of obtaining power alcohol from maize. A valuable special inquiry was made on behalf of a British electrical firm working in India into methods of dealing with the corrosion of concrete and steel transmission towers for electrical power.

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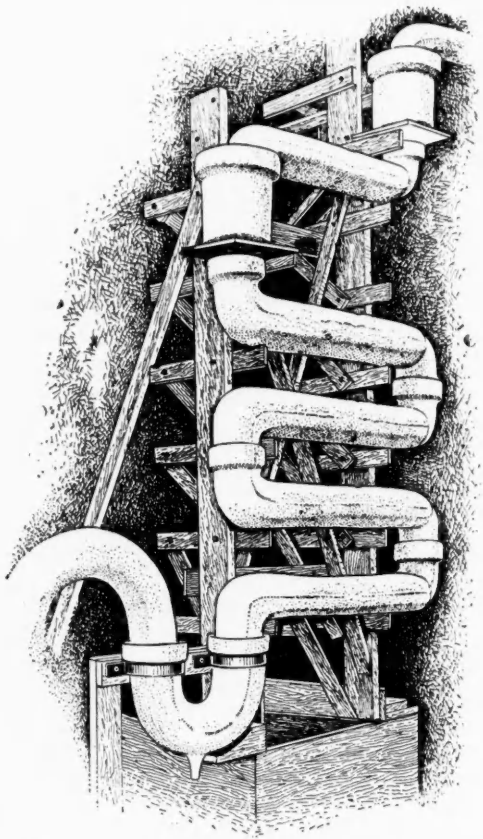

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Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

ELLAND DYEING CO., LTD. (M., 26/4/30.) Registered April 10, £1,700 charge, to F. Ainley, Victoria Road, Elland, and others; charged on property near Elland Bridge, Elland. *Nil. April 2, 1929.

INTERNATIONAL ARTIFICIAL SILK CO., LTD., London, E.C. (M., 26/4/30.) Registered April 12, series of £142,710 debentures and premium of 5 per cent., present isuse £52,710; general charge (subject, etc.). *£57,290. December 31, 1929.

Satisfaction

CHADWICKS (MANCHESTER), LTD., bleachers. (M.S., 26/4/30.) Satisfaction registered March 31, £1,500, part of amount registered June 5, 1912

London Gazette, &c.

Company Winding Up Voluntarily

ANTIMONY PRODUCTS AND CHEMICAL CO., LTD. (C.W.U.V., 26/4/30.) Meeting of creditors at Winchester House, Old Broad Street, London, E.C.2, on April 25.

Partnership Dissolved

C. CALVERT AND CO. (Charles Latimer CALVERT, Edith Amy CALVERT, Henry Reginald HOPE and Eleanor Saunders BIBBY-CHESHIRE), manufacturing chemists, 2, Guide Lane, Audenshaw, Lancashire, by mutual consent as from December 31, 1929.

New Companies Registered

BRITISH PAINTS, LTD., Milburn House, Dean Street, Newcastle-on-Tyne.—Registered April 12. Nominal capital, £100 in £1 shares. Manufacturers and brokers of and dealers in paints, colours, varnishes, enamels, anti-fouling compositions, special protective paints, quick-drying anti-corrosive enamels, etc. A subscriber: S. Horne, 2, Cliftonville, South Gosforth, Northumberland.

CHEMICAL AND PETROLEUM INVESTMENTS, LTD.—Registered as a "private" company on April 12. Nominal capital, £150,000 in £1 shares. To acquire and hold shares, stocks, etc., in the British Isles or elsewhere, and in particular by any company carrying on any business in connection with the chemical and petroleum industries; to carry on all kinds of financial, commercial, trading and other operations, etc. A subscriber: L. A. Ellwood, 18, Austin Friars, London, E.C.2.

THE COMPLEX RESEARCH CO. (ARGENTINE), LTD.—Registered as a "private" company on April 12. Nominal capital, £100 in £1 shares. To acquire the exclusive right to use in Argentine a secret process for the manufacture of gold from chemical and other compounds or matter; and to carry on the business of gold and silversmiths, etc. A subscriber: Renee Epstein, 17B, Frognal, Hampstead, London, N.W.3.

THE COMPLEX RESEARCH CO. (ROUMANIA), LTD.—Registered as a "private" company on April 12. Nominal capital, £100 in £1 shares. The objects are to acquire the exclusive right to use in Roumania a secret process for the manufacture of gold from chemical and other compounds or matter; and to carry on the business of gold and silversmiths, etc. Other particulars are similar to those of the Complex Research Co. (Argentine), Ltd.

PICAROID PROCESSES, LTD., 3, London Wall Buildings, E.C.2.—Registered as a public company on April 22, with a nominal capital of £100,000 in 10s. shares. To carry on the business of manufacturers of and dealers in celluloid and celluloid goods, and paints, goods covered in whole or in part with celluloid, paints, varnish, lacquer, shellac, cellulose, size, pigments, compositions, cements and dyes, manufacturing chemists and druggists, and to acquire the trade mark "Picaroid." Directors: G. S. Adlington, 34A, Carlton Road, Putney Hill, S.W.15; E. S. White, 4, Eslington Terrace, Newcastle-upon-Tyne; F. W. W. Wootton, 41, Church Street, Birmingham, stockbroker.

RUBBERINE-SYNLAC, LTD., 29A, Offord Road, Caledonian Road, N.1.—Registered as a "private" company on April 16. Capital, £1,000 in £1 shares. The objects are to adopt agreements (1) with S. H. Bersey as liquidator of Rubberine, Ltd., for the sale and purchase of certain assets of Rubberine, Ltd., and (2) with the said S. H. Bersey as liquidator of Synlac, Ltd., to purchase certain assets of Synlac, Ltd., and to carry on the business of manufacturers of, and dealers in, rubber substitutes, rubber compounds and artificial rubber, shellac, artificial shellac, shellac compounds and shellac-like substances, varnishes, paints, oils, pigments, enamels, knottings, insulating materials, etc. The directors are: J. Green, 276, Alexandra Park Road, N.22; A. J. Hooper, 286, Alexandra Park Road, N. 22; Ad. Sir Reginald G. O. Tupper, The Links House, Bordon, Hants; J. A. Witt, 137, Lavenham Road, S.W.18.

TAMARA, LTD.—Registered April 19 as a "private" company. Capital £2,000 in 1,000 10 per cent. cumulative preference and 3,000 ordinary shares of 10s. each. To carry on the business of manufacturing and wholesale and retail chemists, druggists and perfumers, chemical engineers, sterilisers, dyers, cleaners, manufacturers and founders of and workers in metals and alloys of all kinds. Directors: J. P. Sheridan (permanent), 23, Rue Madabegh, Cairo; B. Steinberg, Chateau de la Taer, Nice; E. Behar, 10, Rue Sidky, Tarha, Cairo; L. W. Bushnell, 23, Rue Madabegh, Cairo; and A. Xenoudakis, Rue Malek Saleh Choubrah, Cairo.

Tariff Changes

BELGIAN CONGO.—The duties levied on the export of any kind of produce from the Belgian Congo have been withdrawn for two years, as from March 31.

PERU.—Pending the making of suitable provisions for the establishment of the explosives monopoly, explosives imported into Peru must pay a duty (in addition to the normal Customs, etc., charges) of 30 per cent. of their value in warehouse in Peruvian ports. The following goods are subject to the tax, viz.: Gun cotton, blasting powder, nitro-cellulose, pyroxyline or soluble nitro-cellulose, dynamite and gelignites, explosive gelatin and dynamite gelatin, smokeless powder, picric acid or trinitrophenol and compounds thereof; lyddite, melinite, shimose, nitrocellulose, nitro-glycerine and nitro-starch, trinitrotoluol and caps and fuses.

UGANDA PROTECTORATE AND ZANZIBAR.—An Order of February 20, issued under the Uganda Customs Management Ordinance, 1926, prohibits the importation into the Uganda Protectorate of: (*a*) Trade spirits of every kind and beverages mixed with these spirits; and (*b*) distilled beverages containing essential oils or chemical products which are recognised as injurious to health, such as thujone, star anise, benzoicaldehyde, salicylic esters, hyssop and absinthe. A similar prohibition has been imposed in Zanzibar by a Decree dated March 5.

Blount and Co.: "Further Legal Advice"

AT the second annual general meeting of Blount and Co., hosiery manufacturers, Belper, on Wednesday, April 16, Mr. R. J. Weston (who succeeded Dr. S. Miall as chairman on the latter's retirement) reviewed the financial position and stated that in view of the financial transactions with the promoting company, and of the subsequent many changes in the board, contributing to the disastrous trading results, Mr. C. J. Pain, chartered accountant, had been requested to investigate affairs. His report had been circulated to the shareholders, and when the directors had considered it in all its bearings, it was proposed to seek further legal advice as to the action the board ought to take in the interests of the shareholders.

The report was adopted, and Messrs. R. J. Weston, O. J. Jackson, and S. E. Field-Kain were re-elected directors.